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Formulation and Evaluation of Immediate Release Tablet of Piracetam

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Abstract: The aim of this study was to compare the disintegrants efficiency of the three super disintegrants Cross Povidone, Crosscarmellose sodium and Sodium starch glycolate by formulating Piracetam immediate release tablets by direct compression method. Disintegration efficiency of powder disintegrants compared by swelling and hydration capacity of disintegrants. Nine formulations having superdisintegrants at different concentration level were prepared. While efficiency of disintegrants in tablets compared by various test like weight variation, friability, hardness, thickness, disintegration time, drug content and dissolution studies of Piracetam immediate release tablets. The rapid disintegration observed for the Sodium starch glycolate containing tablets comparing three classes of super disintegrants represented by Sodium starch glycolate. Among all the formulations P7 was consider as optimized formulation containg of Sodium starch glycolate with drug release of 99.24%.

Keywords: Piracetam immediate release tablets

1. INTRODUCTION

Immediate release drug formulation is a novel type of drug delivery system which disintegrates rapidly and get dissolved to release the medicaments after administration. Recently, several newer agents were developed known as “Superdisintegrants” such as sodium starch glycolate, crosscarmellose sodium, and crospovidone. These newer substances shows good effectiveness at lower concentrations with greater disintegrating power and mechanical strength. Conventional immediate release drugs include fast disintegrating tablets and granules that are used in effervescent mixture, such as tartaric acid, sodium bicarbonate, etc. Recently immediate release tablets have started gaining popularity and acceptance as a drug delivery system because it has several benefits of easy administration, quick onset of action, economical available and lead to better patient compliance. These are also a tool for expanding markets, generating opportunities and extending product life cycles.

In that present study and research novel drug delivery systems are developed for expanding indications, extending product life cycles and generating opportunities. Oral administration is the most popular route for systemic effects due to its ease of ingestion, pain, avoidance, versatility and most importantly patient compliance. The development of enhanced oral protein delivery technology by immediate release tablets which may release the drugs at an enhanced rate are very promising for the delivery of poorly soluble drugs high molecular weight protein and peptide.[1,2]

The oral route remains the perfect route for the administration of therapeutic agents because the low cost of therapy, manufacturing and ease of administration lead to high levels of patient compliance.

Many patients require quick onset of action in particular therapeutic condition and consequently immediate release of medicament is required. It is estimated that 50% of the population is affected by this problem, which results in a high incidence of ineffective therapy. Immediate release tablets are those which disintegrate rapidly and get dissolved to release the medicaments. Immediate release may be provided for by way of an appropriate pharmaceutically acceptable diluent or carrier, which diluent or carrier does not prolong, to an appreciable extent, the rate of drug release and/or absorption.[2,3]

This term excludes formulations which are adapted to provide for "modified", "controlled", "sustained", "prolonged", "extended" or "delayed" release of drug. Release term includes the provision (or presentation) of drug from the formulation to the gastrointestinal tract, to body tissues and/or into systemic circulation.

The stomach is part of the digestive system and is connected to the:

- Esophagus – a tube-like organ that connects the mouth and throat to the stomach. The area where the esophagus joins the stomach is called the gastroesophageal (GE) junction.
- Small intestine (small bowel) – a long tube-like organ that extends from the stomach to the colon (large intestine or large bowel). The first part of the small intestine is called the duodenum, and it is this part that is connected to the stomach.
- The stomach is divided into 5 regions: The cardia is the first part of the stomach below the esophagus. It contains the cardiac sphincter, which is a thin ring of muscle that helps to prevent stomach contents from going back up into the esophagus.
- The fundus is the rounded area that lies to the left of the cardia and below the diaphragm.
- The body is the largest and main part of the stomach. This is where food is mixed and starts to break down.
- The antrum is the lower part of the stomach. The antrum holds the broken-down food until it is ready to be released into the small intestine. It is sometimes called the pyloric antrum.
- The pylorus is the part of the stomach that connects to the small intestine. This region includes the pyloric sphincter, which is a thick ring of muscle that acts as a valve to control the emptying of stomach contents (chyme) into the duodenum (first part of the small intestine). The pyloric sphincter also prevents the contents of the duodenum from going back into the stomach. 2 Pharmacokinetics It is the study of absorption, distribution, metabolism and excretion. After absorption, drug attains therapeutic level and therefore elicits pharmacological effect, so both rate and extend of absorption is important. In conventional dosage form there is delay in disintegration and therefore dissolution is fast. Drug distribution depends on many factors like tissue permeability, perfusion rate, binding of drug to tissue, disease state, drug interaction etc. Duration and intensity of action depends upon rate of drug removal from the body or site of action i.e. biotransformation. Decrease in liver volume, regional blood flow to liver reduces the biotransformation of drug through oxidation, reduction and hydrolysis. Excretion by renal clearance is slowed, thus half-life of renal excreted drugs increase.
- Pharmacodynamics Drug reception interaction impaired in elderly as well as in young adult due to undue development of organ. Decreased ability of the body to respond reflexive stimuli, cardiac output, and orthostatic hypotension may see in taking antihypertensive like prazosin. Decreased sensitivity of the CVS to α-adrenergic agonist and antagonist. Immunity is less and taken into consideration while administered antibiotics.
- Altered response to drug therapy-elderly show diminished bronchodilator effect of theophylline shows increased sensitivity to barbiturates. Concomitant illnesses are often present in elderly, which is also taken into consideration, while multiple drug therapy prescribed. Research workers have clinically evaluated drug combination for various classes' cardiovascular agents, diuretics, anti-hypertensive etc. for immediate release dosage forms. The combination choice depends on disease state of the patient.

METHODOLOGY

Buffer Preparation:

Preparation of 0.2M Potassium dihydrogen orthophosphate solution: Accurately weighed 27.218 gm of monobasic potassium dihydrogen orthophosphate was dissolved in 1000mL of distilled water and mixed.

Preparation of 0.2M sodium hydroxide solution: Accurately weighed 8 gm sodium hydroxide pellets were dissolved 1000ml of distilled water and mixed.
Preparation of pH 6.8 Phosphate buffer: Accurately measured 250ml of 0.2M potassium Dihydrogen orthophosphate and 112.5 ml 0.2M NaOH was taken into the 1000ml volumetric flask. Volume was made up to 1000ml with distilled water.

Pre formulation Studies

Pre formulation involves the application of biopharmaceutical principles to the physicochemical parameters of drug substance are characterized with the goal of designing optimum drug delivery system.

Analytical method development for Piracetam

Objectives of the work:

a) Determination of absorption maxima

A spectrum of the working standards was obtained by scanning from 200-400nm against the reagent blank to fix absorption maxima. The λ_{max} was found to be 210nm. Hence all further investigation was carried out at the same wavelength.

b) Preparation of Standard graph in pH 6.8 phosphate buffer

100 mg of Piracetam was dissolved in 100 mL of pH 6.8 phosphate buffer to give a concentration in 1mg/mL (1000µg/mL) 1 ml was taken and diluted to 100 ml with pH 6.8 phosphate buffer to give a concentration of 0.01 mg/ml (10µg/ml). From this stock solution aliquots of 0.5 ml, 1 ml, 1.5 ml, 2 ml, 2.5 ml, were pipette out in 10 ml volumetric flask and volume was made up to the mark with pH 6.8 phosphate buffer to produce concentration of 5, 10, 15, 20 and 25µg/ml respectively. The absorbance of each concentration was measured at respective (λmax) i.e., 210nm.

Formulation Development:

- Drug and different concentrations for super Disintegrates and required ingredients were accurately weighed and passed through a 40-mesh screen to get uniform size particles and mixed in a glass mortar for 15 minutes.
- The obtained blend was lubricated with Magnesium stearate and glidant (Talc) was added and mixing was continued for further 5 minutes.
- The resultant mixture was directly compressed into tablets by using punch of rotary tablet compression machine. Compression force was kept constant for all formulations.

Table 7.1: Formulation of Immediate Release tablets

Ingredients	P1	P2	P3	P4	P5	P6	P7	P8	P9
Piracetam	100	100	100	100	100	100	100	100	100
Cross Povidone	25	50	75	-	-	-	-	-	-
Crosscarmellose sodium	-	-	-	25	50	75	-	-	-
Sodium starch glycolate	-	-	-	-	-	-	25	50	75
MCC	223	198	173	223	198	173	223	198	173
Mannitol	20	20	20	20	20	20	20	20	20
Aspartame	15	15	15	15	15	15	15	15	15
Mg stearate	10	10	10	10	10	10	10	10	10
Talc	7	7	7	7	7	7	7	7	7
Total Weight	400	400	400	400	400	400	400	400	400

Total weight of tablets = 400mg

Evaluation parameters:

Pre compression parameters:

Measurement of Micromeritic Properties of Powders

1. Angle of repose

The angle of repose of API powder is determined by the funnel method. The accurately weight powder blend are taken in the funnel. The height of the funnel is adjusted in way that, the tip of the funnel just touched the apex of the powder blend. The powder blend is allowed to flow through the funnel freely on the surface. The diameter of the powder cone is measured and angle of repose is calculated using the following equation.

$$\tan \theta = h/r \quad (1)$$

Where, h and r are the height and redius of the powder cone.

Table 7.2: Flow Properties and Corresponding Angle of Repose

Flow Property	Angle of Repose (^{0})
Excellent	25-30
Good	31-35
Fair- aid not needed	36-40
Passable-may hang up	41-45
Poor-must agitate, Vibrate	46-55
Very Poor	56-65
Very, very Poor	>66

2. Bulk density

The powder sample under test is screened through sieve No.18 and the sample equivalent to 25 gm is weighed and filled in a 100 ml graduated cylinder and the power is levelled and the unsettled volume, V_o is noted. The bulk density is calculated in g/cm^3 by the formula.

$$\text{Bulk density} = M/V_0 \quad (2)$$

M= Powder mass

V_0= apparent unstirred volume

3. Tapped density

The powder sample under test is screened through sieve No.18 and the weight of the sample equivalent to 25 gm filled in 100 ml granulated cylinder. The mechanical tapping of cylinder is carried out using tapped density tester at a nominal rate for 500 times initially and the tapped volume V_0 is noted. Tappings are proceeded further for an additional tapping 750 times and tapped volume, V_b is noted. The difference between two tapping volume is less than 2%, V_b is considered as a tapped volume V_f . The tapped density is calculated in g/cm^3 by the formula.

$$\text{Tapped density} = M/V_f \quad (3)$$

M= weight of sample power taken

V_f= Tapped volume

4. Compressibility Index

The Compressibility Index of the power blend is determined by Carr's compressibility index to know the flow character of a powder. The formula for Carr's Index is a below:

$$\text{Carr's Index (\%)} = [(TD-BD)/TD] \times 100 \quad (4)$$

5. Hauser's ratio

The Hauser's ratio is a number that is correlated to the flow ability of a powder or granular material. The ratio of tapped density to bulk density of the powders is called the Hauser's ratio. It is calculated by the following equation.

$$H=\rho T / \rho B \quad (5)$$

Where ρT= tapped density, ρB = bulk density

Table 7.3: Scale of Flowability

Compressibility Index (%)	Flow Character	Hausner Ratio
≤ 10	Excellent	1.00-1.11
11-15	Good	1.12-1.18
16-20	Fair	1.19-1.25
21-25	Passable	1.26-1.34
26-31	Poor	1.35-1.45
32-37	Very Poor	1.46-1.59
> 38	Very, very Poor	> 1.60

Post compression parameters:

a) Thickness

The thickness of tablets was determined by using Digital micrometer. Ten individual tablets from each batch were used and the results averaged.

b) Weight variation

Twenty tablets randomly selected from each batch and individually weighed. The average weight and standard deviation three batches were calculated. It passes the test weight variation test if not more than two of the individual tablets weights deviate from the average weight by more than the allowed percentage deviation and more deviate by more than twice the percentage shown. It was calculated on an electronic weighing balance.

c) Friability

The friability values of the tablets were determined using a Roche-type friabilator. Accurately weighed six tablets were placed in Roche friabilator and rotated at 25rpm for 4 min.

Percentage friability was calculated using the following equation.

$$\text{Friability} = ([w_0-w] / w_0) \times 100$$

d) Assay

The content of drug was carried out by five randomly selected tablets of each formulation. The five tablets were grinded in mortar to get powder; this powder was dissolved in pH 6.8 phosphate buffer by sonication for 30 min and filtered through filter paper. The drug content was analyzed spectrophotometrically at 210nm using UV spectrophotometer. Each measurement was carried out in triplicate and the average drug content was calculated.

e) Disintegration test

Six tablets were taken randomly from each batch and placed in USP disintegration apparatus baskets. Apparatus was run for 10 minutes and the basket was lift from the fluid, observe whether all of the tablets have disintegrated.

f) Dissolution test of Piracetam tablets

Drug release from Piracetam tablets was determined by using dissolution test United States Pharmacopoeia (USP) 24 type II (paddle). The parameters used for performing the dissolution were pH 6.8 Phosphate Buffer as the dissolution medium of quantity 500ml. the whole study is being carried out at a temperature of 37°C and at speed of 50 rpm. 5 ml aliquots of dissolution media were withdrawn each time at suitable time intervals (5, 10,15,20,30 and 45minutes) and replaced with fresh medium. After withdrawing, samples were filtered and analyzed after appropriate dilution by UV Spectrophotometer. The concentration was calculated using standard calibration curve.

Drug-Excipients compatibility studies:

Drug Excipients compatibility studies were carried out by mixing the drug with various excipients in different proportions (In 1:1 ratio were prepared to have maximum likelihood interaction between them) was placed in a vial, and closed with rubber stopper and sealed properly.

8. RESULTS AND DISCUSSION

Determination of λ_{max} :

The prepared stock solution was scanned between 200-400 nm to determine the absorption maxima. It was found to be 210nm.

Calibration curve of Piracetam

The standard curve of Piracetam was obtained and good correlation was obtained with R^2 value of 0.999 the medium selected was pH 6.8 phosphate buffer.

Table 8.1: Standard graph values of Piracetam at 210nm in pH 6.8 phosphate buffer

Concentration (µg/ml)	Absorbance
0	0
5	0.135
10	0.267
15	0.392
20	0.521
25	0.652

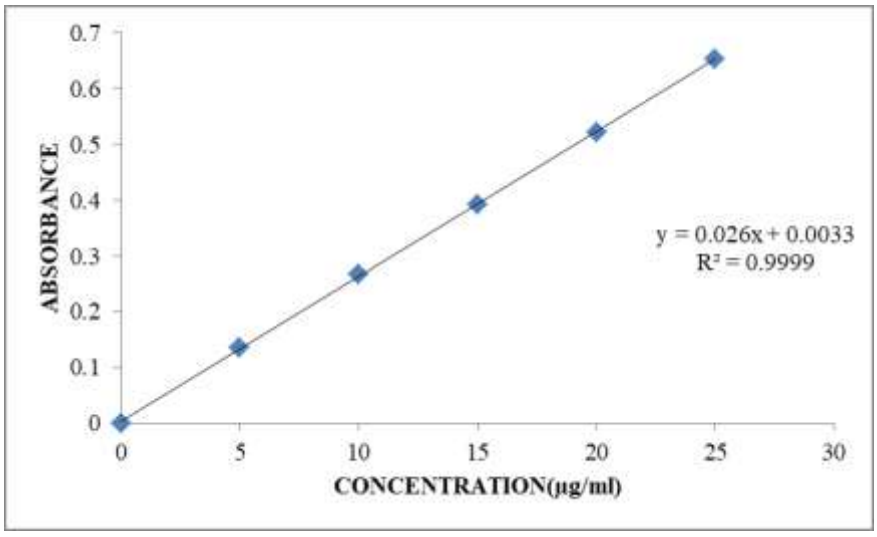

Fig 8.1: Standard curve of Piracetam

Evaluation:

Characterization of precompression blend:

The precompression blend of Piracetam was characterized with respect to angle of repose, bulk density, tapped density, Carr's index and Hausner's ratio. Angle of repose was less than 29.9^0 ,Carr's index values were less than 27.55 for the precompression blend of all the batches indicating good to fair flowability and compressibility. Hausner's ratio was less than 1.48 for all batches indicating good flow properties.

Table 8.2: Physical properties of precompression blend

Formulation code	Angle of repose (Ɵ)	Bulk density (gm/cm^3)	Tapped density(gm/cm^3)	Carr's index (%)	Hausner's ratio
P1	32º47' ±0.62	0.25 ± 0.01	0.27 ± 0.01	10.41 ± 0.27	1.08 ± 0.03
P2	33º28'±0.83	0.28 ± 0.01	0.31 ± 0.05	11.55 ± 3.52	1.13 ± 0.04
P3	33º21' ±0.83	0.24 ± 0.03	0.27 ± 0.03	11.22 ± 4.21	1.12 ± 0.05
P4	32º29' ±0.91	0.29 ± 0.01	0.33 ± 0.01	7.09 ± 2.82	1.13 ± 0.03
P5	34 º17'±1.07	0.23 ± 0.01	0.28 ± 0.01	17.04 ± 2.82	1.20 ± 0.04
P6	34º06' ±0.53	0.27± 0.06	0.31 ± 0.07	11.83 ± 2.85	1.13 ± 0.03
P7	31º09'±2.12	0.26 ± 0..03	0.29 ± 0.02	10.44 ± 3.94	1.11 ± 0.05
P8	30º01'± 1.37	0.25 ± 0.02	0.29 ± 0.04	13.32 ± 5.22	1.15 ± 0.07
P9	33º01' ±1.18	0.22 ± 0.02	0.25 ± 0.25	13.10 ± 1.14	1.15± 0.15

All the values represent n=3

Evaluation of tablets:

Physical evaluation of Piracetam Immediate release tablets:

The results of the weight variation, Hardness, Thickness, Friability, and Drug content of tablets are given in table 8.3. All the tablets of different batches complied with the official requirement of weight variation as their weight variation passes the limit. The hardness of the tablets ranged from 3.98 - 4.77 kg/cm^2 and the friability values were < than 0.69 % indicating that the tablets were compact and hard. The thickness of the tablets ranged from 3.61 – 4.63. All the formulations satisfied the content of the drug as they contained 97.95 - 99.55% of Piracetam and good uniformity in drug content was observed. Thus all physical attributes of the prepared tablets were found to be practically within control limits.

Table 8.3: Evaluation of Piracetam Immediate release tablets

Formulation code	Weight variation (mg)	Thickness (mm)	Hardness (Kg/cm^2)	Friability (%)	Content uniformity (%)	*In Vitro* Disintegration time (seconds)
P1	399.22	3.47	4.28	0.21	98.72	35
P2	398.33	3.68	4.12	0.35	99.55	42
P3	400.28	3.92	4.33	0.28	97.49	39
P4	401.48	3.61	4.53	0.42	99.38	31
P5	399.36	4.21	4.39	0.33	99.47	55
P6	399.22	3.54	4.77	0.43	98.65	43
P7	400.11	3.83	3.98	0.26	97.95	39
P8	399.35	3.72	4.05	0.37	98.28	48
P9	398.12	4.63	4.62	0.45	99.32	44

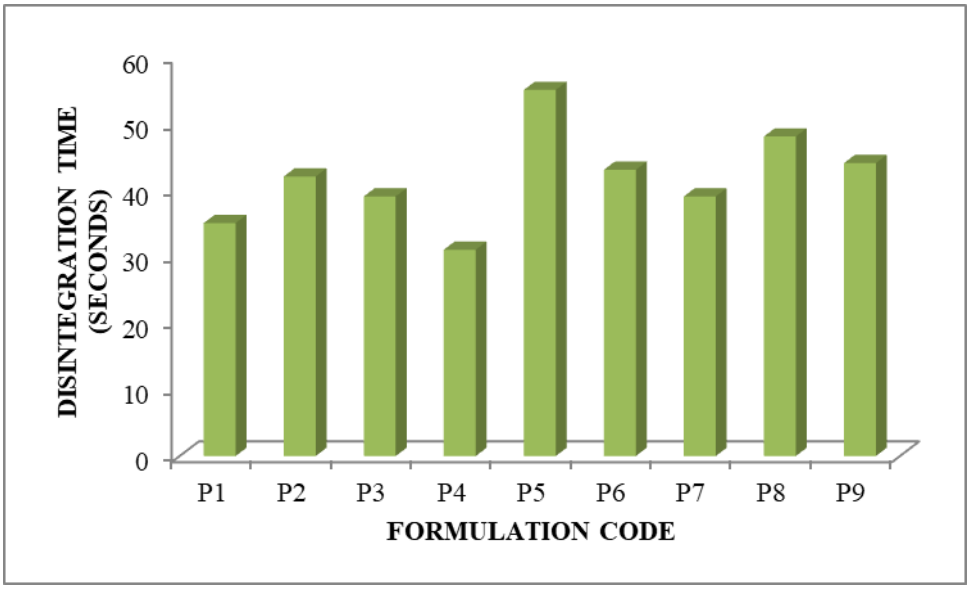

Fig 8.2: *In vitro* disintegration time graph

***In vitro* Dissolution:** The drug release rate from tablets was studied using the USP type II dissolution test apparatus. The dissolution medium was 500 ml of pH 6.8 phosphate buffer at 50 rpm at a temperature of 37±0.5 ˚C. Samples of 5 ml were collected at different time intervals up to 45min and has analyzed after appropriate dilution by using UV spectrophotometer at 210nm

Table 8.4: *In vitro* data for formulation P1- P9

TIME (Minutes)	*IN VITRO* DRUG RELEASE								
	P1	P2	P3	P4	P5	P6	P7	P8	P9
0	0	0	0	0	0	0	0	0	0
5	55.99	57.24	68.69	61.41	62.37	56.57	62.02	58.71	66.85
10	63.75	65.59	76.41	75.61	76.29	65.81	73.17	67.69	69.47
15	69.25	68.51	82.72	79.93	87.07	72.26	77.71	75.53	74.39
20	77.87	79.05	87.85	87.72	88.12	87.01	87.29	79.28	85.64
30	78.44	84.98	96.61	88.89	91.46	89.37	92.08	88.69	93.22
45	89.21	88.23	90.01	97.17	95.38	97.41	99.24	96.82	97.29

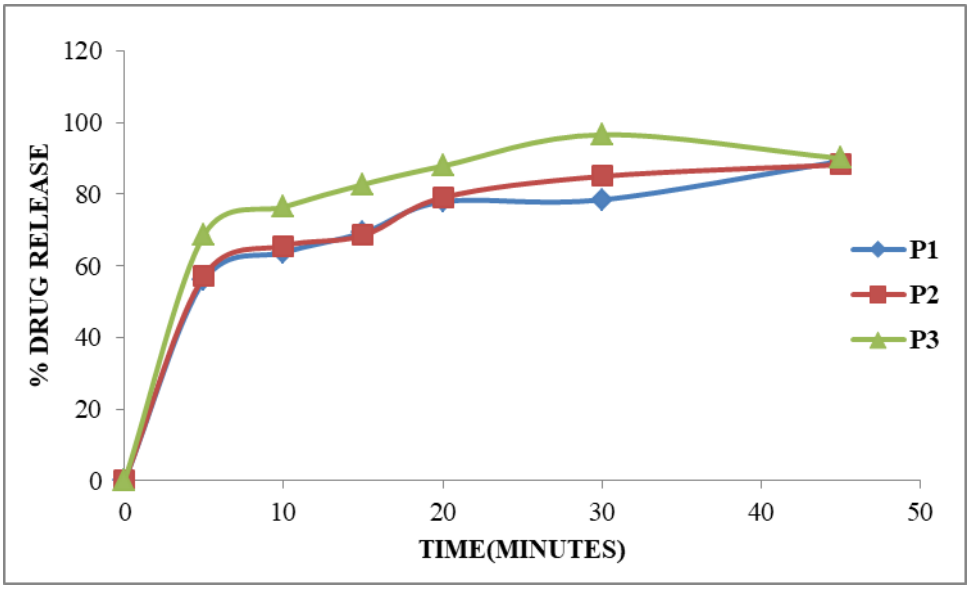

Fig 8.3*: In vitro* dissolution data for formulation P1-P3

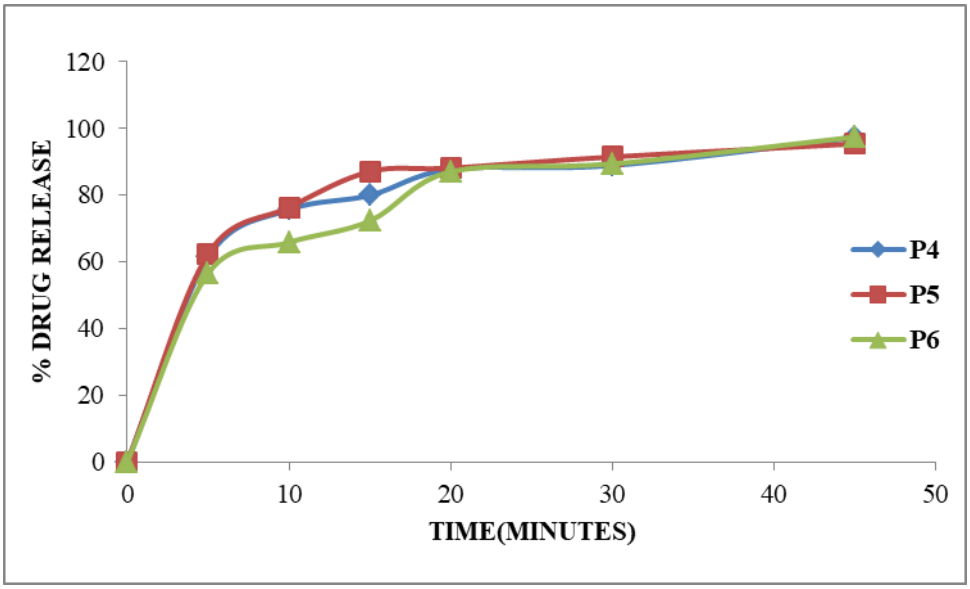

Fig 8.4: *In vitro* dissolution data for formulations P4-P6

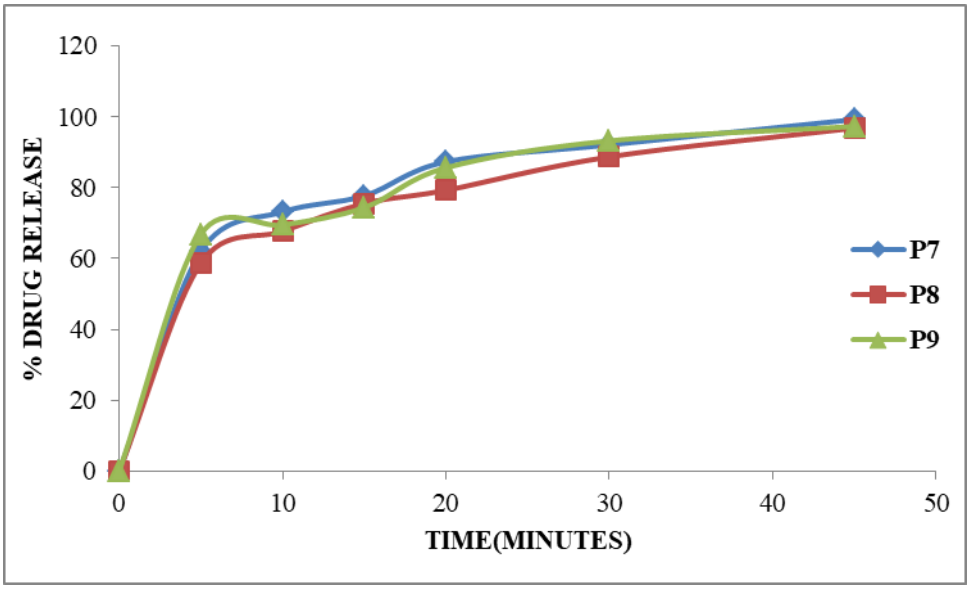

Fig 8.5: *In vitro* dissolution data for formulations P7-P9

From the table it was evident that the formulation prepared with Cross Povidone were showed good drug release i.e., P3 formulation (90.01%) From the table it was evident that the formulation prepared with Crosscarmellose sodium were showed good drug release i.e., P6 formulation (97.41%) From the table it was evident that the formulation prepared with Sodium starch glycolate were showed good drug release i.e., P7 formulation (99.24%)

Among all formulations P7 considered as optimized formulation which showed maximum drug release at 45 min i.e., 97.41 %. Sodium starch glycolate showed good release when compared to Cross Povidone and Crosscarmellose sodium Finally concluded that P7 formulation contains Sodium starch glycolate was optimized formulation.

Drug-Excipient compatibility studies by FTIR studies:

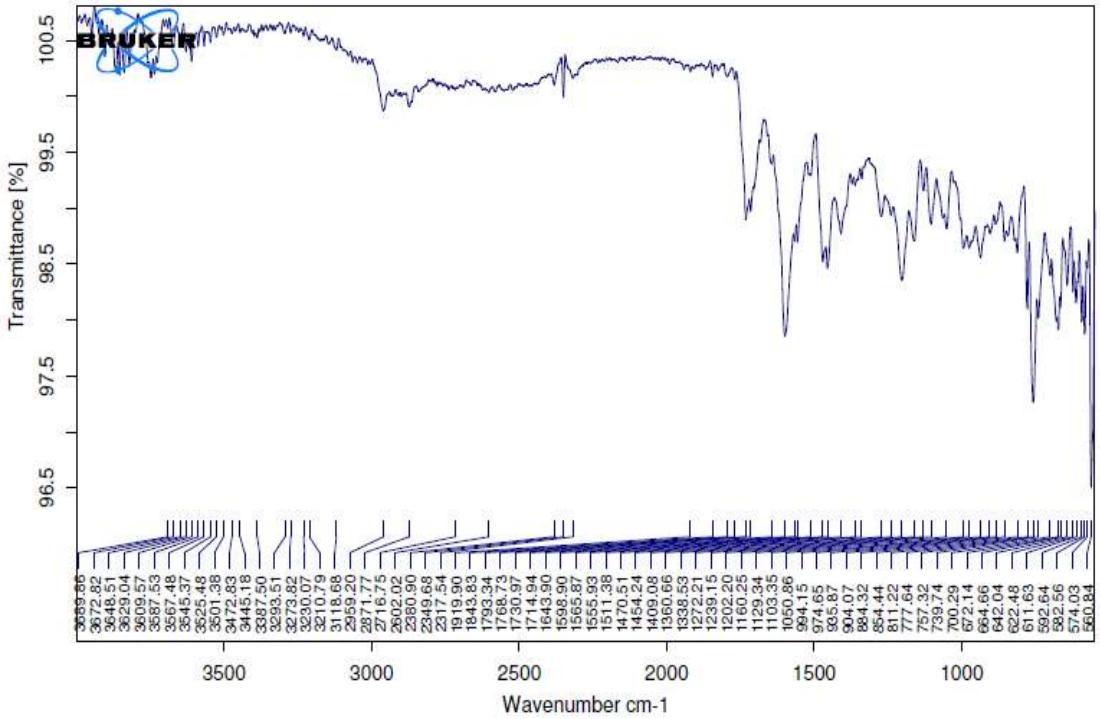

Fig 8.6: FTIR spectra of pure drug

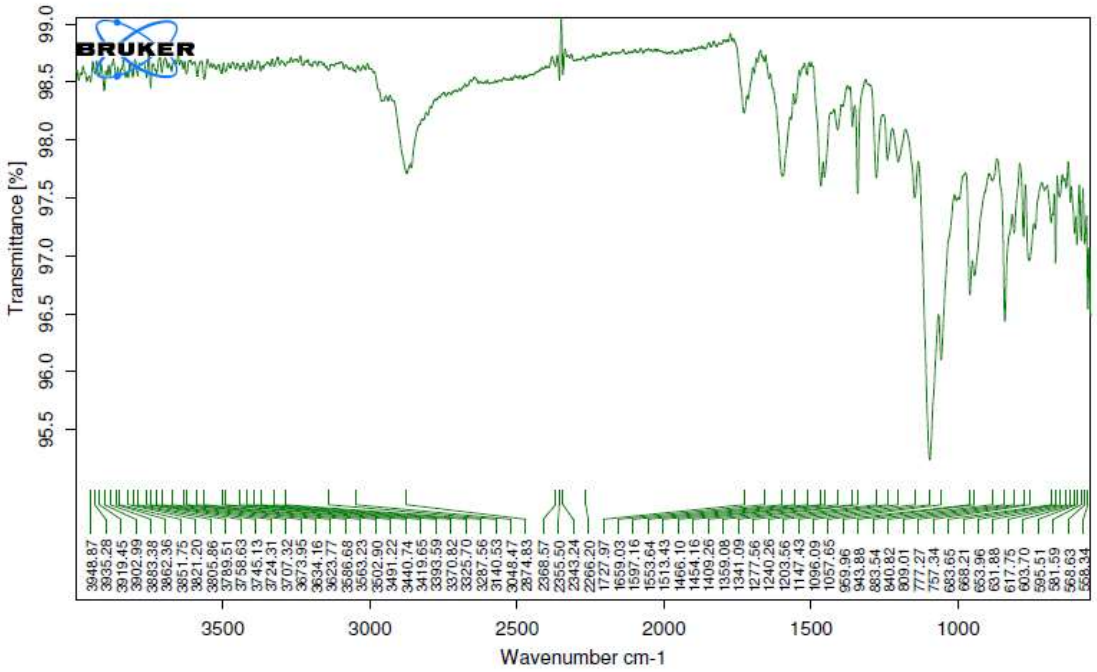

Fig 8.7: FTIR spectra of optimized formulation

Piracetam was mixed with various proportions of excipients showed no colour change at the end of two months, providing no drug –excipient interactions.

9. CONCLUSION

All formulations were found to be satisfactory when evaluated for thickness, weight uniformity, hardness, friability, drug content uniformity, disintegration time and *in vitro* drug release. The Tablet disintegration time was less than one minute for all the tablet formulations. The *in vitro* drug release in optimized formulation P7 was found to be 99.24% in 45 Minutes. The optimized formulation P7 also showed

satisfactory hardness (3.98 - 4.77) kg/cm^2 Friability (0.21 - 0.45) drug content (97.95 - 99.55) weight variation (398.12 - 401.48 mg) disintegration time (31 – 55 sec).

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REFERENCES

1. Leon Lachman, Herbert A, Liberman and Joseph L. Kaing: The Theory And Practice Of Industrial Pharmacy: 293-303.
2. Bhavin Patel, Dr. M.S. Ranawat, Dr. Chetan Singh Chauhan, Jaimin Modi Design, Development and Characterization of Immediate Release Tablet of Pioglitazone. JPSBR, March April 2013; 3(2): 91-99.
3. Aulton`S Pharmaceutics, The Design & Manufacture Of Medicines,Biopharmaceutics And Pharmacokinetics, A Treatise, Second Edition, ValabhPrakashan, 315-38
4. Syed A, et al, “Immediate Release Drug Delivery Systems: A Review”, International journals of Biopharmaceutical & Toxicological Research., 2001. 4. Ansel`S Pharmaceutical Dosage Forms & Drug Delivery Systems, Eighth Edition, 227-260.
5. Rana AS, Hari Kumar SL, Manufacturing Defects of Tablets - A Review, Journal of Drug Delivery and Therapeutics, 2013; 3(6):200-206. doi:10.22270jddt.v3i6.722
6. Vaishali Kilor, Nidhi Sapkal, Awari J, Shewale B. Development And Characterization Of Enteric-Coated Immediate-Release Pellets Of Aceclofenac By Extrusion/Spheronization Technique Using Carrageenan As A Pelletizing Agent, AAPS Pharmscitech, 2010; 11(1): 336- 343.
7. Manish Jaimini and Saurabh Rawat- A Review on Immediate Release Drug Delivery System, RJPBCS, AprilJune 2013; 4(2): 1726.
8. Rawlins EA. Tablets and Capsules. In: Bentleys.Text book of pharmaceutics. New Delhi: All India Traveller Publishers. 2006; 234-310.
9. Cooper, J., Gunn, C., “Powder flow and compaction”, In: Carter SJ, eds. Tutorial Pharmacy. CBS Publishers and Distributors, New Delhi, India. 1986; 211-233.
10. Dedhiya et al, “Lercanidipine immediate release compositions” United States Patent Application 2006.
11. Dandare MS et al. Bilayer tablet: A Novel approach for immediate release of telmisartan and hydrochlorthaizide combination. International Journal of Pharmacy & Technology April 2012; 4(1): 3970-3983.
12. Margret Chandira. R., Jayakar.B, Pasupathi, A. Chakrabarty and BL Maruya P: Design, Development and Evaluation of Immediate Release Atorvastatin and Sustained Release Gliclazide Tablets, Journal of Pharmacy Research. 2009; 6(2).
13. Bhowmick et al, Fast Dissolving Tablet: An Overview, Journal of Chemical and Pharmaceutical Research, 2009, 1(1): 163-177
14. A Gupta, AK Mishra, V Gupta, P Bansal, R Singh and AK Singh: Review Article, Recent Trends Of Fast Dissolving Tablet - An Overview Of Formulation Technology, International Journal Of Pharmaceutical & Biological Archives., 2010; 1(1): 1 – 10.
15. Reddy LH: Fast Dissolving Drug Delivery Systems: A Review Of The Literature, IJPS. 2002: 331-336
16. R. Natarajan, Rohit Vaishnani, and NN. Rajendran,Formulation and Evaluation Immediate Release Tablets of Paroxetine HCl Using Different Superdisintegrants, International Journal of Research in Pharmaceutical and Biomedical Sciences,Vol. 2 (3) Jul – Sep 2011.
17. Garg A, Gupta M, Taste masking and formulation development & evaluation of mouth dissolving tablets of levocetrizine dihydrochloride. Journal of Drug Delivery and Therapeutics, 2013; 3(3):123-130. doi:10.22270/jddt.v3i3.514

18. Patel U, Patel K, Shah D, Shah R. A review on immediate release drug delivery system. International journal of pharmaceutical research and bio-science. 2012; 1 (5): 37-66.
19. Bhattacharjee A. Formulation and evaluation of immediate release tablets of bromocriptine mesylate by direct compression method. Indo American journal of pharmaceutical research. 2013; 3(3): 2841-2845.
20. Alton ME. Pharmaceutics the science of dosage form design. Second edition. Churchill livngstone; 2002.
21. Gowtham M, Vasanti S, Rhan RD, Ashwath N, Paridhavi M. Formulation and evaluation of immediate release folic acid tablets. Scholars research Library. 2011; 3(6): 157-162.
22. Pathak N, Kumar A, Methkar V, Pant P, Rao RT. Formulation and optimization of immediate release tablet of an antialcoholic drug by dry granulation method. International Journal of comprehensive pharmacy. 2011; 2(3): 1-4.
23. Sood R et al. Immediate release antihypertensive valsartan oral tablet: A Review. Journal of Scientific Research in Pharmacy May 2012; 1(2): 20-26.
24. Patel N, Naruka PS, Chauhan CS, Modi J. Formulation development and evaluation of immediate release tablet of topiramateanti Epileptic Drug. Journal of Pharmaceutical Science and Bioscientific Research 2013; 3(2): 58-65.
25. Sandeep N, Gupta MM. Immediate drug release dosage form: a review. Journal of drug delivery & therapeutics. 2013; 3(2): 155-161.
26. Patel N, Natarajan R, Rajendran NM, Rangapriya M. Formulation and evaluation of immediate release bilayer tablets of Telmisartan and hydtochlorothiazide. International journal of pharmaceutical sciences and nanotechnology. 2011; 4(3): 1477-1482.
27. SusijitSahoo, B. Mishra, P.IK. Biswal, Omprakash Panda, Santosh Kumar Mahapatra, Goutam Kumar Jana, Fast Dissolving Tablet: As A Potential Drug Delivery System, Drug Invention Today 2010, (2), 130- 133.
28. Nyol Sandeep, Dr. M.M. Gupta. Immediate Drug Release Dosage Form: A Review. Journal Of Drug Delivery & Therapeutics;2013, 3(2), 155-161.
29. Reddy. L.H et al., "Fast dissolving drug delivery systems: A review of the literature, IJPS. 2002:331-336.
30. Wale Kiran et al. Immediate Drug Release Dosage Form: A Review. American Journal OfPharmtech Research. 2014 4(1): 191-212.
31. MangalMohit, Thakral Sunil, Goswami Manish, GhaiPankaj. Superdisintegrants: An Updated Review. Int J Pharma Sci Res 2012; 2(2) 26-35.
32. Patel Utsav, Khushbu Patel, Shah Darshan, Shah Rushabh. A Review On Immediate Release Drug Delivery System. Int J Pharma Res AndBiosci 2012; (5): 37-66.
33. Karimban JA et al. "Formulation and Evaluation Of Immediate Release Venlafaxine HCI tablets: Comparative Study of Super Disintegrant and Diluents". International Research Journal of Pharmacy, 2012, 3(4), 324-329.
34. RS Shekhar et al. "Recent Trends of Oral Fast Disintegrating Tablets- An Overview of Formulation and Taste Masking Technology". Research Journal of Pharmaceutical, Biological and Chemical Sciences, 2012;3(1):771-793.
35. Wagh MP et al. Formulation and evaluation of fast dispersible tablets of aceclofenac using different superdisintegrant. International Journal of Pharmacy and Pharmaceutical Sciences 2010; 2(1): 154-157.
36. Patel JA et al. Formulation and evaluation of immediate release tablet of azithromycin by dry granulation method using super disintegrants. American Journal of Pharm Tech Research 2011; 1(4): 211-218.

37. Vaishani Ret al. Formulation and evaluation of immediate release tablets of paroxetine HCI using different superdisintegrants. International Journal of Research in Pharmaceutical and Biomedical Sciences Sept 2011; 2 (3): 1095-1099.
38. Patel U, Patel K, Shah D, Shah R. A review on immediate release drug delivery system. International journal of pharmaceutical research and bio-science. 2012; 1(5): 37-66.
39. Bhattacharjee A. Formulation and evaluation of immediate release tablets of bromocriptine mesylate by direct compression method. Indo american journal of pharmaceutical research, 2013; 3(3): 2841-2845.
40. Alton ME. Pharmaceutics the science of dosage form design. Second edition. churchilllivngstone, 2002.
41. Gowtham M, Vasanti S, Rohan RD, Ashwath N, Paridhavi M. Formulation and evaluation of immediate release folic acid tablets. Scholars Research Library, 2011; 3(6): 157-162.
42. Pathak N, Kumar A, Methkar V, Pant P, Rao RT. Formulation and optimization of immediate release tablet of an antialcoholic drug by dry granulation method. International Journal of comprehensive pharmacy, 2011; 2(3): 1-4.
43. Shilpa SK, Kumar AM, Garigeyi P. Formulation and optimization of clopidogrel bisulfate immediate release tablet. International journal of pharmaceutical, chemical and biological sciences, 2012; 2(1): 38-51.
44. Deepak G, Rahul R, Senthil A, Uday S. Formulation and evaluation of irbesartan immediate release tablets. International research journal of pharmacy, 2012; 3(4): 410-415.
45. Patel N, Naruka PS, Chauhan CS, Modi J. Formulation Development and Evaluation of Immediate Release Tablet of Topiramateanti Epileptic Drug. Journal of Pharmaceutical Science and Bioscientific Research, 2013; 3(2): 58-65.
46. Bansal M, Bansal S, Garg G. Formulation and Evaluation of Immediate Release Tablets of Zaltoprofen, Scholars Academic Journal of Pharmacy, 2013; 2(5): 398-405.
47. Ansel HC, Popovich NG, Allen LV. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems. Ninth edition. London, New Yorl. Copyright by Lippincott Williams & Wilkins, 2011.
48. Ajaykumar B, Sridivya G, Narendrababu NV, Reddi L, Ujvala K, Sekhar CB, Chandra R. Formulation and evaluation of secnidazole conventional tablets by direct compression method. International journal of pharmacy and biological sciences, 2012; 2(3): 364-371.
49. Bokshi B, Malakar A. Formulation and evaluation of allylestrenol immediate release tablets. International journal of pharmaceutical sciences and research, 2012; 3(6): 1679-1683.
50. Syed A, et al, "Immediate Release Drug Delivery Systems: A Review", International journals of Biopharmaceutical & Toxicological Research., 2001; 1: 24-29.
51. Hitesh P P, et al, "Formulation & evaluation of immediate release tablets of Zolpidem tartrate by direct compression", International journal of pharmaceutical science review & research, 2011; 7: 80-82.
52. Manoj A W, et al, "Techniques used in orally disintegrating drug delivery system", International journal of drug delivery, 2010; 2: 98-107.
53. A.K. Tiwari, H. Shah, A. Rajpoot, Manmohan Singhal, Formulation and In-vitro Evaluation of Immediate release tablets of Drotaverine HCl, Journal of Chemical and Pharmaceutical Research, 2011; 3(4): 333-341
54. Patel U, Patel K, Shah D, Shah R. A review on immediate release drug delivery system. International journal of pharmaceutical research and bio-science, 2012; 1(5): 37-66.
55. Sandeep N, Gupta MM. Immediate drug release dosage form: a review. Journal of drug delivery & therapeutics, 2013; 3(2): 155-161.
56. Shweta Thakur , Ramakant Sharma, Shabnam Khan, Jeevan Patel and Rakesh Patel. Formulation and evaluation of immediate release tablet of Cisapride. World Journal of Biology Pharmacy and Health Sciences, 2023, 14(01), 043–054.

57. A B Chinchawade , S L Jadhav , D D Gaikwad, Formulation and Evaluation of Immediate Release Tablet of Lercanidipine HCL. International Journal of Research in Engineering and Science (IJRES) ISSN (Online): 2320-9364, ISSN (Print): 2320-9356 www.ijres.org Volume 11 Issue 9 ǁ September 2023 ǁ PP. 69-72.
58. Singh B, Sharma A, Chaudhary Amit, Saini Geetanjali,Vyas Manish.Design, Formulation, and In-vitro Evaluation of Immediate Release Tablet of Etoricoxib using Quality by Design Approach. Journal of Applied Pharmaceutical Sciences and Research. 2023; 6(1):25-33.
59. M. Lakshmi Prasanna, P. Prajna, P. Chinnari, P. Anusha, P.N.R. Sri Harshini and P.V.L.S. Ratna. formulation and evaluation of rivaroxaban immediate release tablets. IJRPC 2022, 12(2), 129-138,
60. Suresh Jadhav, Shankar Dhobale, Dushyant Gaikwad, Omkar Lohote, Harshad Padekar. Design, Formulation and Evaluation of Immediate Release Tablets Of Hydrochlorthiazide. Bull. Env. Pharmacol. Life Sci., Vol 10 [2] January 2021 : 65-74.
61. Dhruv Patel, Upendra Patel, Maitri Shukla, Bhavin Bhimani, Ghanshyam Patel. Formulation and Evaluation of Immediate Release Tablet of Simvastatin. Research J. Pharm. and Tech. 2020; 13(1):421-224. doi: 10.5958/0974-360X.2020.00082.7.
62. Mr. Dhruv Patel, Dr. Upendra Patel, Maitri Shukla, Mr. Bhavin Bhimani, Mr. Ghanshyam Patel. Formulation and Evaluation of Immediate Release Tablet of Simvastatin. Research J. Pharm. and Tech. 13(1): January 2020.