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# FORMULATION AND EVALUATION OF LOSARTAN POTASSIUM MATRIX TABLETS BY USING DIFFERENT POLYMERS

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## ABSTRACT

*The study aims to create a sustained release matrix tablet for Losartan potassium, an angiotensin II receptor antagonist, to improve patient compliance and maintain therapeutic blood or tissue levels for extended periods. The research investigates the role of novel semi-synthetic polymers and natural polymers in comparison to well-known release retarding agents. Gastroretentive drug delivery systems (GRDDS) are unique technologies designed to improve drug bioavailability and absorption by avoiding the first-pass effect. Losartan potassium, an angiotensin II receptor antagonist, has a bioavailability of 32% and a low elimination half-life, making it suitable for oral controlled release. The study utilized natural and synthetic polymers in matrix tablet preparation, concentration, drug particles size, additives, and excipients to modify drug release. The powder mixtures were tested for pre-compression parameters and post-compression parameters, and in-vitro dissolution studies showed good dissolution profiles for drug release. Formulations with higher concentrations and polymers sustained drug release for 24 hours. FT-IR Spectroscopy confirmed drug compatibility with polymers and other excipients*

**KEYWORDS**: *matrix tablets, Losartan Potassium, flow properties, pre compression parameters post compression parameters, In-vitro dissolution.*

## INTRODUCTION

This research aims to create a sustained release matrix tablet for Losartan potassium, an angiotensin II receptor antagonist, to improve patient compliance and maintain therapeutic blood or tissue levels for extended periods. Matrix systems offer advantages like easy manufacturing, versatility, effectiveness, low cost, and high molecular weight compound release. Gastroretentive drug delivery systems (GRDDS) are unique technologies designed to improve drug bioavailability and absorption by avoiding the first-pass effect. Losartan potassium, an angiotensin II receptor antagonist, has a bioavailability of 32% and a low elimination half-life, making it suitable for oral controlled release. The study utilized natural and synthetic polymers in matrix tablet preparation, concentration, drug particles size, additives, and excipients to modify drug release. The research investigates the role of novel semi-synthetic polymer and natural polymer in comparison with well-known release retarding agents, and the synergistic effect of the polymers in combination on retarding drug release.

**Advantages of sustain release dosage forms**

1. Decrease in frequency of intakes.
2. Reduce side effects.
3. Uniform release of drug over time.
4. Enhance patient compliances.

**Disadvantages of sustain release dosage form**

1. Increased cost.
2. Toxicity due to dose dumping.
3. Unpredictable and often poor in vitro-in vivo correlation.
4. Increased potential for first-pass clearance.

**Table 1: Formulation tablets showing various composition**

| F-CODE | F1 | F2 | F3 | F4 |
|---|---|---|---|---|
| Losartan Potassium | 50mg | 50mg | 50mg | 50mg |
| Polyvinylpyrrolidone | 10mg | 10mg | 10mg | 10mg |
| Microcrystalline cellulose | 180mg | 170mg | 160mg | 150mg |
| Mannitol | 30mg | 40mg | 50mg | 60mg |
| Talc | 3mg | 3mg | 3mg | 3mg |
| Mg stearate | 2mg | 2mg | 2mg | 2mg |
| Hydroxypropyl methylcellulose | 25mg | 25mg | 25mg | 25mg |
| Total weight | 300mg | 300mg | 300mg | 300mg |

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## METHODOLOGY

Losartan potassium[API] is a gift sample obtained from Vasudha Pharma Chem Limited, Polyvinylpyrrolidone[PVP] is obtained from Akhil Healthcare Private limited, Microcrystalline cellulose[MCC] is obtained from Jigchem Universal, Mannitol (Diuretic) was obtained from Amrutha organics, Talc (Filler) was obtained from Vestige Marketing Pvt Ltd Magnesium stearate (Emulsifier) was obtained from Hiranya cellulose Product, Hydroxypropyl methylcellulose[HPMC] is obtained from Biochemix Healthcare Private Limited.

**Preparation of sustain release matrix tablets by direct compression method:**

Losartan Potassium matrix tablets were prepared by direct compression method. The corresponding amount of drug and excipients were accurately weighed and mixed properly and the matrix tablets were prepared by direct compression using punching machine. Each tablet contains 50 mg of Losartan Potassium.

**Preparation of pH 6.8 phosphate buffer:** Accurately measured 250 mL of 0.2 M potassium dihydrogen orthophosphate and 112.5 mL of 0.2 M NaOH was taken into the 1000 mL volumetric flask. Volume was made up to 1000 mL with distilled water.

## RESULTS AND DISCUSSION

**Construction of calibration curve:**

**Table 2: Data for standard graph of Losartan potassium**

| S.NO | Concentration (ug/ml) | Absorbance (249 nm) |
|---|---|---|
| 1. | 0 | 0 |
| 2. | 5 | 0.11925 |
| 3. | 10 | 0.21325 |
| 4. | 15 | 0.33125 |
| 5. | 20 | 0.43755 |
| 6. | 25 | 0.56125 |

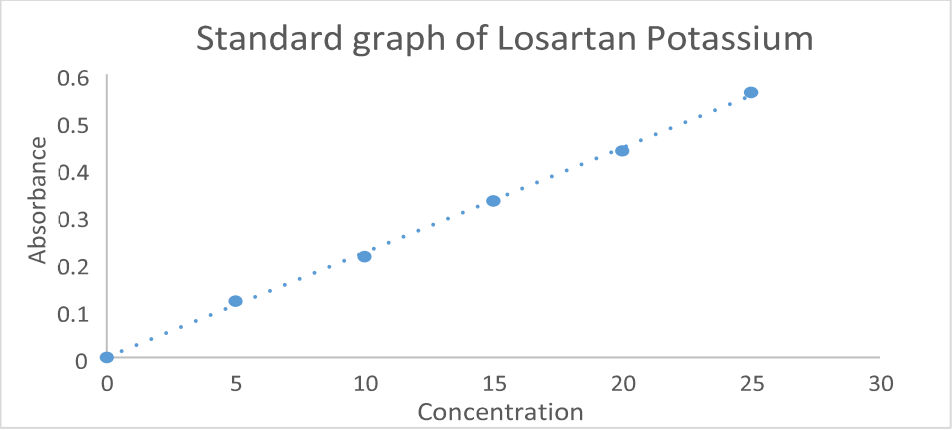


**Fig no.01:Standard graph of Losartan Potassium with 0.1N HCL Solution.**

## DRUG-EXCIPIENT COMPATIBILITY STUDIES BY FTIR

The development of a successful formulations depends only on suitable selection of excipients. Hence the physical state of the drug, Losartan potassium individually and the admixture of the drug and excipients for the optimized formulations were studied by FTIR (Fourier Transform Infrared Spectroscopy) to know the drug excipients compatibility.

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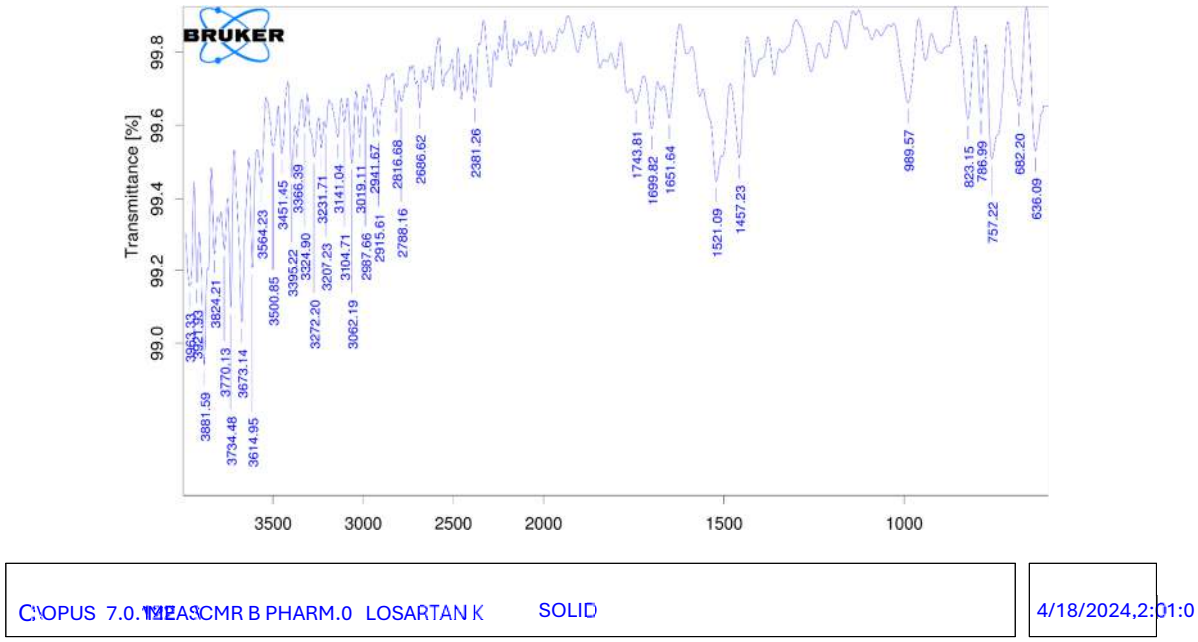


**Fig no.02:FTIR spectra of pure drug Losartan Potassium**

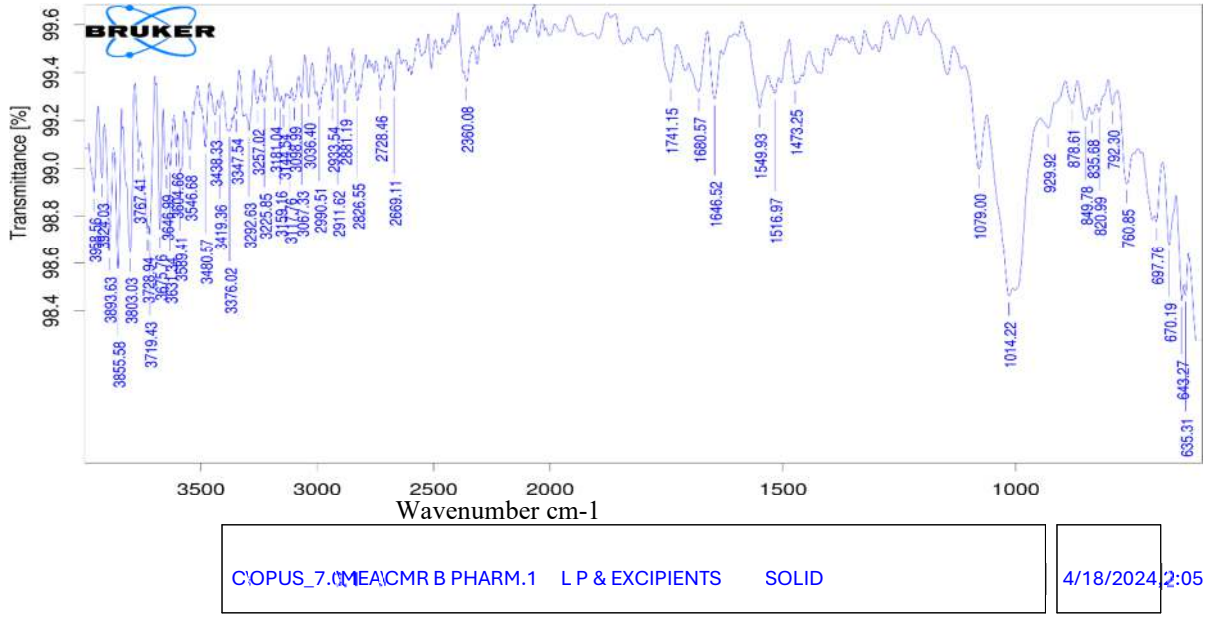


**Fig no.03:FTIR of Losartan Potassium optimized formulation**

## PRE-FORMULATION STUDIES:

**TABLE 3: Results for pre-formulations studies**

| Formulation | Bulk density (gm/cc) | Tapped density (gm/cc) | Angle of repose (0) | Carr's Index (%) | Hausner's Ratio |
|---|---|---|---|---|---|
| F1 | 0.461 | 0.571 | 29.06 | 19.26 | 1.23 |
| F2 | 0.420 | 0.501 | 26.56 | 16.16 | 1.19 |
| F3 | 0.467 | 0.567 | 27.24 | 17.63 | 1.21 |
| F4 | 0.483 | 0.591 | 28.01 | 18.27 | 1.22 |

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## POST FORMULATION STUDIES

**TABLE 4: Results of post formulation studies**

| Formulation | Weight variation (mg) | Friability (%) | Hardness (kg/cm$^2$) | Thickness (mm) |
|---|---|---|---|---|
| F1 | 250.89±0.12 | 0.61±0.007 | 7.3±0.04 | 3.9±0.09 |
| F2 | 253.88±0.60 | 0.52±0.005 | 7.8±0.03 | 4.0±0.02 |
| F3 | 251.12±0.52 | 0.58±0.031 | 8.0±0.07 | 4.2±0.01 |
| F4 | 249.81±0.13 | 0.72±0.016 | 6.5±0.04 | 3.9±0.07 |

## *IN VITRO* DISSOLUTION STUDIES

**TABLE 5: Cumulative % drug release for formulations (F1-F4)**

| Time | F1 | F2 | F3 | F4 |
|---|---|---|---|---|
| 5 min | 55.10 | 58.9 | 46.07 | 51.06 |
| 10 min | 68.67 | 72.1 | 56.29 | 61.07 |
| 15 min | 76.01 | 80 | 73.93 | 76.55 |
| 20 min | 82.09 | 87.08 | 74.01 | 79.61 |
| 25 min | 92.07 | 94.82 | 79.06 | 89.06 |

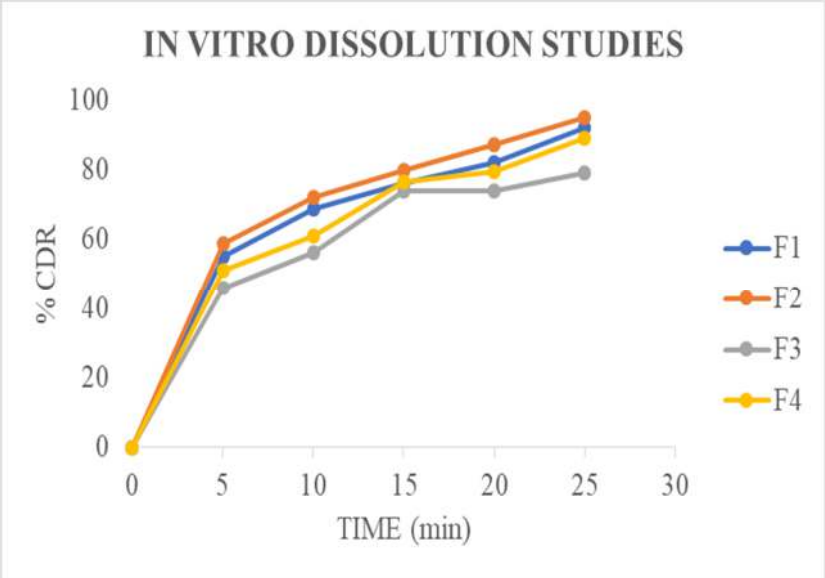


**Fig no.04: Comparative dissolution profile of formulation F1 to F4**

## CONCLUSION

From the above results we can conclude that Losartan potassium was formulated with different types of different polymers like Mannitol ,Magnesium stearate and Micro crystalline cellulose. The results of dissolution studies indicated that formulation F2 is the most successful of the study, exhibited drug release pattern very close to theoretical release profile. The pre-formulation studies like angle of repose, bulk density, tapped density, Hausner's ratio and carr's index of all formulations were found to be within the standard limits. FTIR studies revealed that there was no chemical interaction between drug and other excipients.

## REFERENCES

1. *Devi D, Ghosh A, Mandal UK. Sustained release matrix tablet of 100 mg losartan potassium: Formulation development and in vitro characterization. Brazilian Journal of Pharmaceutical Sciences. 2022 Nov 4;58:e20079.*
2. *Rahamathulla M, Saisivam S, Alshetaili A, Hani U, Gangadharappa HV, Alshehri S, Ghoneim MM, Shakeel F. Design and evaluation of losartan potassium effervescent floating matrix tablets: In vivo x-ray imaging and pharmacokinetic studies in Albino Rabbits. Polymers. 2021 Oct 10;13(20):3476.*
3. *Viswanath V, Chandrasekhar U, Rao BN, Prakash KG. Development and evaluation of sustained release matrix tablets of losartan potassium. International Journal of Applied Pharmaceutical Sciences and Research. 2016 Dec 6;1(04):127-32.*
4. *Suryadevara V, Lankapalli SR, Vejella UM, Mupparaju S, Chava S. Formulation and evaluation of losartan potassium osmotic controlled matrix tablets. Indian J Pharm Educ. 2014 Oct 1;48:18-26.*
5. *Khobragade SM, Upadhye KP. Formulation devlopment and evaluation of mucoadhesive microsphere of losartan potassium by using natural polymer. Int J Pharm Sci Res. 2013 Nov 1;4(11):4290-302.*

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6. *Dhobale A, Mahale A, Shirsat M, Joshi D, Dhembre G, Thakare M. Design, Development and Characterization of Losartan Potassium Sustained Release Matrix Tablet. World J. Pharm. Pharm. Sci. 2018;7:1349-62.*
7. *Shanmugam S, Chakrahari R, Sundaramoorthy K, Ayyappan T, Vetrichelvan T. Formulation and evaluation of sustained release matrix tablets of Losartan potassium. Int J Pharm Tech Res. 2011 Jan;3(1):526-34.*
8. *Raju DB, John KS, Varma MM. Formulation and evaluation of losartan potassium matrix tablets for oral controlled release. J Chem Pharm Res. 2010;2(2):130-5.*
9. *Lachman L, Lieberman HA, Kanig JL. The theory and practice of industrial pharmacy. Philadelphia: Lea & Febiger; 1976.*
10. *Rao TV, Kumar GK, Ahmed MG, Joshi V. Development and evaluation of chitosan based oral controlled matrix tablets of losartan potassium. International Journal of Pharmaceutical Investigation. 2012 Jul;2(3):157.*