WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Formulation and Evaluation of Sustained Release Matrix Tablets Glimipride

Ch. Saibabu, Challapalli Anusha* and Karavadi Thejomoorthy

Department of Pharmaceutics, Malineni Lakshmaiah College of Pharmacy, Kanumalla, Singarayakonda-523101

ABSTRACT

In the present study Fast dissolving drug delivery system of Captopril were successfully developed in the form of Fast dissolving oral thin films which offers a suitable and practical approach in serving desired objective of faster disintegration and dissolution characteristics with increase bioavailability. Fast dissolving films of Captopril were prepared by using Crospovidone and Microcrystalline cellulose as superdisintegrants. Evaluation of Captopril fast films such as Physical appearance and surface texture Weight uniformity Thickness uniformity folding endurance Surface pH In vitro disintegration time Drug content uniformity In vitro drug release. The obtained results were as per IP Specified limits. Drug and polymer incompatibility studies showed that they were no interaction between drug and excipients used in present study.

Key words: Captopril Gelatin, PVA, HPMC, Crospovidone, Microcrystalline cellulose, PEG 400.

Introduction

Among the different routes of administration, the oral route of administration continues to be most preferred route due to various advantages including ease of administration, avoidance of pain, versatility and most importantly patient compliance. One such relatively new dosage form is the oral strip, a thin film that is prepared using hydrophilic polymers that rapidly dissolves on the tongue or buccal cavity. Recently, fast dissolving drug delivery system have started gaining popularity and acceptance as new drug delivery systems, because they are easy to administer and lead to better compliance. These delivery system either dissolve or disintegrate in mouth rapidly, without requiring any water to aid inswallowing.[1-4] They also impart unique product differentiation, thus enabling use asline extensions for existing commercial products. This novel drug delivery system can also be beneficial for meeting the current needs of the industry are improved solubility/stability, biological half life and bioavailability enhancement of drugs. [5-6]

Although oral disintegrating tablets have an advantage of administration without choking and fast disintegration; the disintegrated materials contained in them are insoluble and remain until swallowing. In such cases formulation of fast dissolving film will be advantageous.[4,5] Nearly 35-50% of the general population, especially the elderly and children suffer from dysphagia or difficulty in swallowing, which results in high incidence of non-compliance and ineffective therapy. Swallowing problems also are very common in young individuals because of their poorly developed muscular and nervous systems. Other groups who may experience problems in swallowing conventional oral dosage forms are the patients with tremors of extremities, mentally ill, developmentally disabled, non-cooperative and patients with reduced liquid intake or patients suffering from nausea, as well as patients travelling or who do not have easy access to water. The swallowing problems are also common in some cases such as patients with motion sickness, sudden episodes of allergic attack or coughing and due to lack of water.Many pharmaceutical dosages are administered in the form of pills, granules, powders, and liquids. Generally, a pill design is for swallowing intact or chewing to deliver a precise dosage of medication to patients [7-9].

MATERIALS AND METHODS

Captopril were obtained from Matrix Pvt. Ltd. Hyderabad Gelatin, P.V.A, HPMC, Crospovidone, Microcrystalline cellulose, PEG 400 were obtained from Signet Chemical Corp., Mumbai.

FORMULATION OF FAST DISSOLVING FILMS OF CAPTOPRIL:

Calculation of dose for Captopril:

The dose of Captopril is 50mg. Therefore amount of Captopril required in 2cm

diameter of film is 50mg.

i. Area of film of 2cm diameter is 6.28 sq.cm.

ii. Area of petridish of 6.5cm diameter is 66.31 sq.cm.

iii. Amount of drug present in 6.28 sq.cm of film is 5mg

iv. Amount of drug present in 66.31 sq.cm of petridish is 52.79 mg. Therefore, 66.31 sq.cm of petridish should contain 5mg of drug. It is fixed for all formulations. Therefore amount of Captopril in each film (2cm diameter) is 5mg.

From the preliminary physical observation of the films prepared the best compositions were used for the incorporation of Captopril. Gelatin, PVA and HPMC polymers was dissolved in water with continuous stirring. Calculated amount of Captopril was dissolved in the polymeric solution, after complete dissolution of the drug; propylene glycol (plasticizer) was added and stirred to form a homogeneous solution. The solution was casted onto mercury substrate then kept in hot air oven at 40ºC for 24 hrs. The film thus formed was cut into size of 2 cm diameter. Each film contains 5 mg of Captopril. The detailed compositions of the Captopril films are given in fast dissolving films of Captopril were prepared by solvent casting technique employing mercury as substrate. The fast films were prepared using polymers like gelatin, PVA and HPMC. PG is used as plasticizer. The calculated amount of polymer was dispersed in three forth volume of with continuous stirring using magnetic stirrer and the final volume was adjusted with distilled water. The

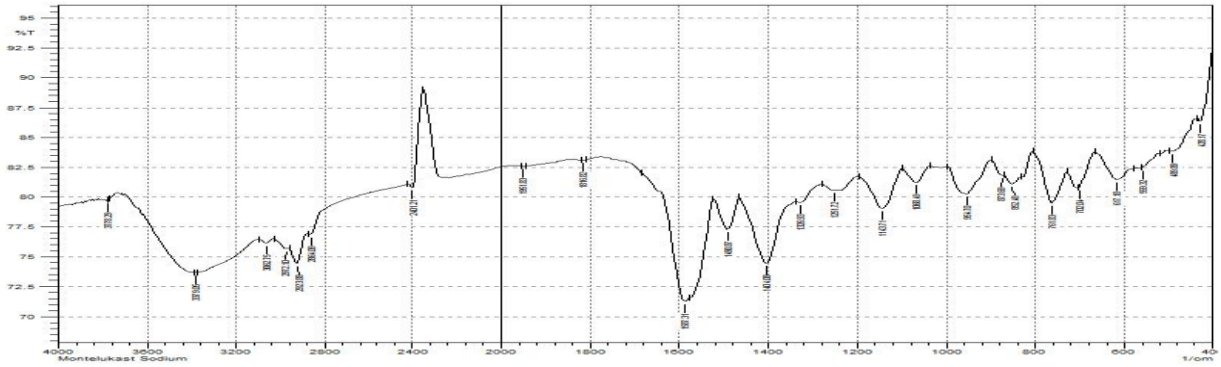
Formulation	Captopril	Gelatin	PVA	HPMC	Crospovide	MCC polymer)	Sucrose polymer)	Citricacid polymer)	PolyEthylene polymer)
F 1	50	4.5	--	--	2.0	--	4.0	4.0	30
F2	50	4.5	--	--	4.0	--	4.0	4.0	30
F3	50	4.5	--	--	6.0	--	4.0	4.0	30
F4	50	4.5	--	--	--	5	4.0	4.0	30
F5	50	4.5	--	--	--	10	4.0	4.0	30
F6	50	4.5	--	--	--	15	4.0	4.0	30
F7	50	--	3.5	--	2.0	--	4.0	4.0	30
F8	50	--	3.5	--	4.0	--	4.0	4.0	30
F9	50	--	3.5	--	6.0	--	4.0	4.0	30
F10	50	--	3.5	--	--	5	4.0	4.0	30
F11	50	--	3.5	--	--	10	4.0	4.0	30
F12	50	--	3.5	--	--	15	4.0	4.0	30
F13	50	--	--	5.0	2.0	--	4.0	4.0	30
F14	50	--	--	5.0	4.0	--	4.0	4.0	30
F15	50	--	--	5.0	6.0	--	4.0	4.0	30
F16	50	--	--	5.0	--	5	4.0	4.0	30
F17	50	--	--	5.0	--	10	4.0	4.0	30
F18	50	--	--	5.0	--	15	4.0	4.0	30

calculated amount of Captopril was incorporated in the polymeric solutions after levigation with required volume of PEG. The solution was casted on to mercury substrate then kept in hot air oven at 40^0c films of various formulations are mentioned in Table-3. The films were punched in to size 2cm diameter containing 5mg of Captopril. By carring out the trial and error method different concentrations of film forming polymers were used like gelatin, PVA and HPMC. It has been found that 4%of gelatin, 3% of PVA and 4% of HPMC shows better films. Which these concentrations of films were prepared by dissolving different quantities of film forming polymers in 10 ml of water.

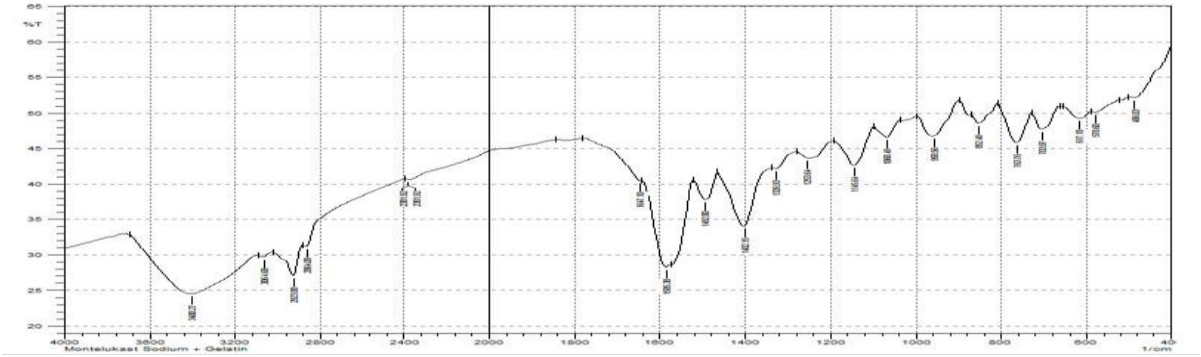
In vitro Dissolution Study:

In vitro dissolution of Captopril mouth dissolving films was studied in USP XXIV dissolution test apparatus 900ml 0.5% SLS solution was used as dissolution medium. The stirrer was adjusted to rotate at 50rpm. The temperature of dissolution medium was maintained at 37±0.5ºC throughout the experiment. One film was used in each test. Samples of dissolution medium (5ml) were withdrawn means of syringe fitted with pre-filter at known intervals of time and analyzed for drug release by measuring the absorbance at 205nm. The volume withdrawn at each time interval was replaced with fresh quantity of dissolution medium. Cumulative percent Captopril released was calculated and plotte d against time

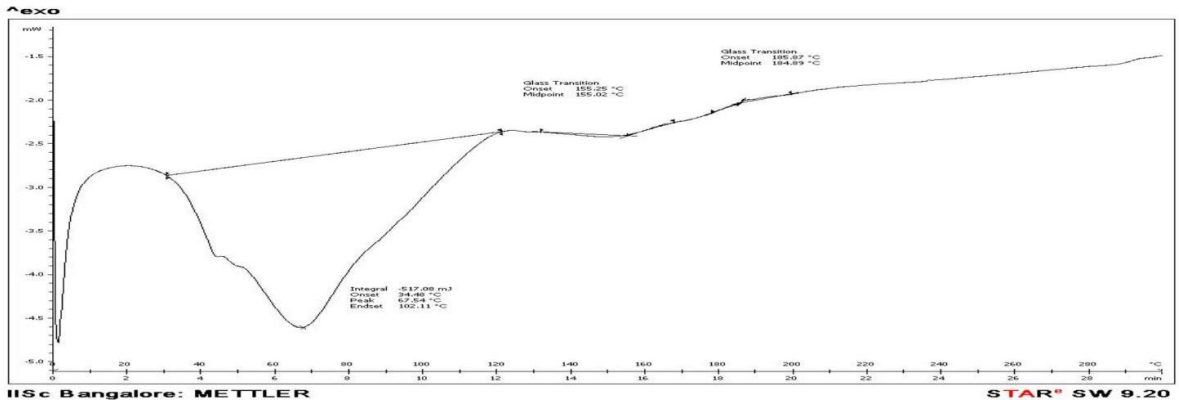
FTIR Spectrum



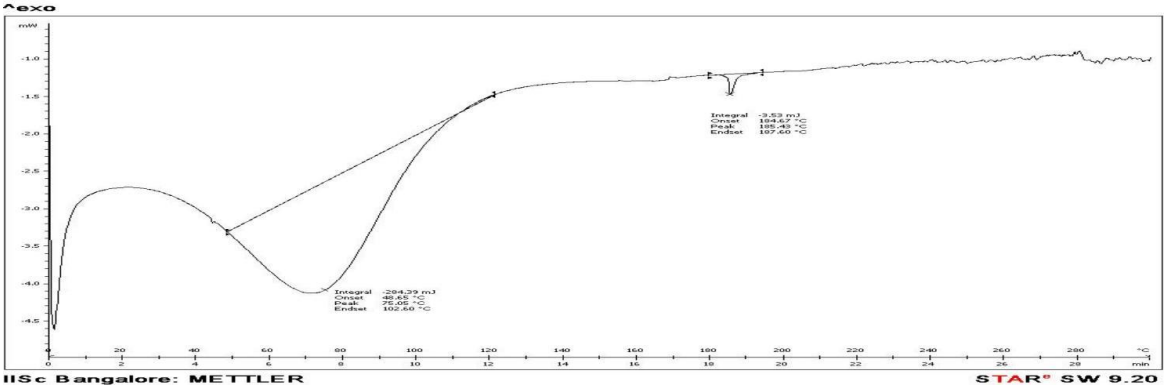
FTIR OF PURE DRUG



FTIR of the drug and polymer



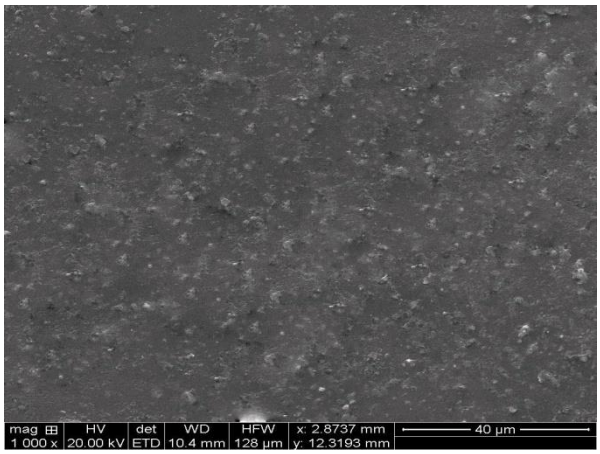
DSC OF PURE DRUG



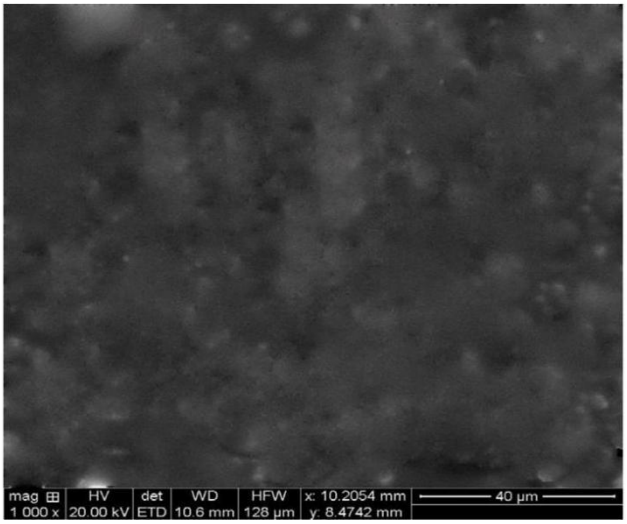
DSC Spectrums of the drug and polymer

Scanning Electron Microscopy

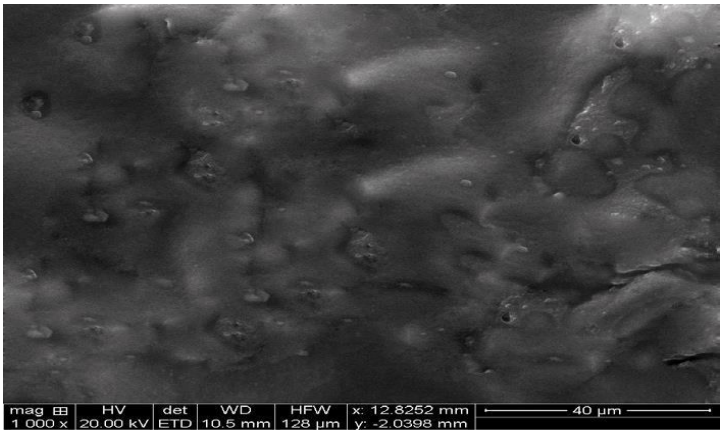
The prepared film containing Captopril was clear and colourless. The scanning electron photomicrograph of the film at 1000 X magnification showed smooth surface with some little pores and without any scratches or transverse



SEM of Drug + Gelatin



SEM of Drug + PVA



SEM of Drug + HPMC.

Conclusion:

Captopril were prepared by solvent casting method using superdisintegrants such as, crospovidone and MCC. Captopril is soluble in water but its bioavailability is limited . The dispersion time of films were reduced by superdisintegrants like crospovidone and MCC. From the findings obtained, it can be concluded that:-

- FT-IR studies revealed that there is no chemical interaction between Captopril andexcipients used in the study. The DSC thermograms of Captopril with other excepitents doesnot show profound shift in peaks which indicates compatibility.
- The prepared film containing Captopril was clear and colourless. The scanning electron photo micrograph of the film at 1000 X magnification showed smooth surface with somelittle pores and without any scratches or transverse striations
- Formulated films gives satisfactorily result for various physico-chemical evaluation of films like physical appereance, and surface texture, weight uniformity, thickness uniformity, Folding endurance Surface pH, Drug content uniformity, In vitro Disintegration time, In vitro drug release The low values of standard deviation for average weight and drug content weight and drug content uniformity within the batches prepared. Based on in vitro dispersion time, formulation F_2 , F_8 and F_{14} that is with 4% Crospovidone were approximately 7-10 s and the formulation F_5 , F_{11} and F_{17} that is with 10% MCC were approximately 10-14 s. which it was found to be promising dispersion time.
- It was observed from the results that, CP formulations showed maximum dissolution rate about 99.27% of drug release in 30 min. Whereas MCC showed dissolution rate about 97.42% of drug release in Short-term stability studies of promising formulation indicated that there is no significant change in drug content and in vitro dispersion time.
- Fast dissolving films of Captopril can be prepared by Solvent casting method using superdisintegrants.
- Crospovidone was found . At 4% w/w of crospovidone with 3% PVA concentration level dispersion time of 7.23±0.151 sec highest release of more than 99.27% drug in 30 min.

REFERENCES

1. Dixit R, Puthli S. Oral strip technology: Overview and future potential. J. Control
2. Release 2009; 139: 94-107.
3. Arya A, Chandra A, Sharma V, Pathak K. Fast dissolving oral films: An Innovative Drug
4. Delivery system and Dosage form. Int. J. Chem. Tech. Res. 2010:2: 576-83.
5. Mashru C, Sutariya V, Sankali M, Parikh P. Development and evaluation of fast-dissolving film of salbutamol sulphate. Drug Dev. Ind. Pharm. 2005; 31: 25-34.
6. Nishimura MMatsuurab K, Tsukioka T, Yamashita H, Inagaki N, Sugiyama T, Itoh Y. *In vitro* and *in vivo* characteristics of prochlorperazine oral disintegrating film. International Journal of Pharmaceutics 2009 Oct 15; 398: 98–102.
7. Shimoda H, Taniguchi K, Nishimura M, Matsuura K, Tsukikoka T, Yamashita H, Hirano K, Yamamoto M, Kinosada Y, Itoh Y. Preparation of a fast dissolving oral thin film containing dexamethasone: A possible application to antiemesis during cancer chemotherapy. European Journal of Pharmaceutics and Biopharmaceutics. 2009 Aug 31.
8. Slowson M, Slowson, S. What to do when patients cannot swallow their medications. Pharm Times. 1985;51: 90-96.
9. Doheny K. You really expect me to swallow those horse pills? Am Druggist. 1993; 208: 34-35.