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To study on formulation and evaluation of lansoprazolesodium enteric coated tablet by using super disintegrant

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ABSTRACT
The main of the study of the formulation and evaluation of enteric coated lansoprazole tablet for the protecting of the drug to the acidic medium in the gastric. It actsby the inhibiting proton pump(H^+/K^+) which are present in the gastric parietal cell.Lansoprazole fast disintegrating tablet and more convenient formulation of lansoprazole which can be taken with or without water. Lansoprazole is the first proton pump inhibitor which is available as an orally disintegrating tablet.Solvent casting method is used for the formulation of lansoprazole tablet. In the formulation of the lansoprazole cross-povidone used as binder and super-disintegrants. Hot-melt extrusion (HME) technologyto improve the physiochemical properties of lansoprazole (LNS) to prepare stable enteric coated LNS tablets. This technique is decrease manufacturing processing time of enteric coated tablet. For the evaluation of lansoprazole drug interaction Fourier-transform infrared studies, differential scanning calorimetry analysis–X-diffraction studies, and scanning electron microscopic studiesare carried out.

Keywords: Proton pump inhibitor, Lansoprazole, Cross-povidone, Enteric coating.

I. INTRODUCTION

Lansoprazole is the first proton pump inhibitors which is taken by oral route with or without water. Lansoprazole (LNS) is a benzimidazole derivative proton pump inhibitor. Delivery of therapeutic agent into the intestinal region could be accomplished by the application of an enteric coating on a solid dosage form. Lansoprazole is a classic example of proton pump inhibitors and is approved by FDA for the treatment of symptomatic gastro-oesophageal reflux disease, short-term treatment and maintenance of erosive esophagitis. A number of enteric coating polymers are available and capable of protecting the drug core from the aggressive environments of the stomach. On the other hand, pH-sensitive delivery systems such as enteric-coated dosage forms off er a simple and practical means for intestinal drug delivery. To improve the solubility of LNS, many solid dispersion techniques have been used. Furthermore, addition of an alkalizer can improve the solubility of lansoprazole, which increases with the increase in the pH [1]. Being soluble at higher pH values, these polymers dissolve in the intestine and release the core for ready action.These polymers include several synthetic polymers like polymethacrylates (Eudragits), cellulose acetate phthalate (CAP), hydroxy propyl methyl cellulose phthalate (HPMCP). The aim of the present study was to compare the suitability of these renowned polymers to develop enteric coated tablets of a very sensitive proton pump inhibitor, Lansoprazole. Lansoprazole also exhibits antibacterial activity against Helicobacter pylori in vitro [2]. Gastroesophageal reflux disease (GERD) is a highly prevalent condition, affecting 10–30% of the adult population in Western countries [3] and utilizing significant healthcare resources. When left untreated, or when treated inadequately, GERD can produce a spectrum of potentially severe complications. Lansoprazole has been studied extensively in a number of acid-related diseases [4], and a growing number of studies support its safety and clinical efficacy when used as long-term maintenance therapy to prevent EE relapse [5].

II. OBJECTIVES

- To develop analytical method for the estimation of λ max determination and standard calibration curve
- To perform various pre-formulation studies
- To study the drug-excipients compatibility studies.
- To prepare and formulate the pantoprazole sodium enteric coated tablets using different super disintegrants in different ratios.
- To evaluate the post-compressional parameters.

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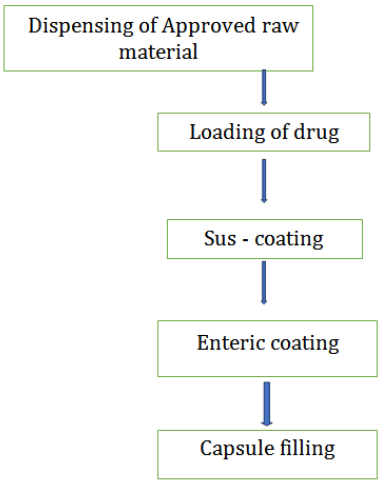
•The stability studies perform as per the ICH guidelines.

• To choose the best formulations which shows better releasing profile.

Formulation

Process of formulation [6]



1. Screening

• Required quantity of sugar spheres (sugar spheres USP-NF) were passed through sieve no 20.

•Sieve no20 passed spherical sugar balls were sifted through sieve no 25 and retains were collected.

2. Drug Coating ¬ Preparation of Drug Suspension

•Hydroxy propyl cellulose was dissolved in Purified water, and continuous stirring till clear solution was formed.

• Now sucrose was added under continuous stirring.

• Low substitute hydroxy propyl cellulose was added to above solution under continuous stirring to get uniform dispersion. Remaining quantity of water was added to above solution

• Corn starch and Heavy magnesium carbonate were added to above solution and stirred about 20 minutes and get uniform dispersion.

• Lansoprazole was slowly added and the stirring was continued until a uniform suspension was formed.

•And last stepssodium lauryl sulphate was added to the above solution.

3. Sub Coating (Barrier Coating) ¬ Preparation of Sub coating dispersion

• Hydroxy propyl cellulose was dissolved in distilled water and stirred until get a clear solution.

• Sucrose was added to the above solution and stirred.

• Low substitute hydroxy propyl cellulose was added to above solution and remaining quantity of distilled water was added to the solution and stirred abouttwentyminutes.

•Andnow corn starch was added to above solution and stirred until get a uniform dispersion.

4. Enteric coating ¬ Preparation of Enteric coating Dispersion

•Distilled water was taken in a stainless-steel vessel. Methacrylic acid copolymer was slowly added to the distilled water and the contents were blend for 30 minutes under continuous stirring.

• TEC was taken in to a beaker and distilled water was added and mixed for five minutes and then Polysorbate 80 was added to the solution under continuous blending.

• Talc was added to above solution and mixed to get uniform dispersion.

• Solution of the above step was added slowly to first step under continuous blending and mixed for about 30 minutes.

• The dispersion obtained was sifted through sieve no 100 and collected in a stainless-steel vessel.

5. Preparation of pellets- The pellets were prepared in a fluidized bed processor by the solution or suspension layering technique. The sugar spheres were loaded onto fluidized bedprocessor and warmed before treatment with drug solution. PEG 6000 used as a plasticizer in both barrier and enteric coating [6].

6. Drug layering- Low substituted Hydroxypropyl Cellulose (LHPC), HPC GF, LMC, Sucrose, corn

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starch and drug dispersed in to purified water under stirring and the stirring was continued until to achieve to uniform dispersion, which was given 34.5% solid content [6].

7. Barrier layer- Barrier layer is also called the separating polymer or protective layer, whose primary function was to minimize the interaction between the drug and the enteric polymer. This layer also provides a smooth base for the application of the enteric layer and improves drug stability [6].

8. Lubrication- The enteric coated pellets were lubricated with 1% of purified talc and Colloidal silicon dioxide to avoid abrasion between the pellet and ease of distribution in the GIT after released from the capsule [6].

9. Capsule filling- The enteric coated pellets were encapsulated in to Hard gelatin size „1" capsules with Pink coloured cap printed with logo and yellow coloured body printed with „2201[6].

Evaluation

Bulk density-. It is defined as the mass of many particles of the material divided by the total volume they occupy. The total volume includes particle volume, inter-particle void volume, and internal pore volume.

The reading of density was continued until no further change in volume was recorded using the following equation.

Bulk density = Weight of tablet/volume of tablet [6]

Carr's index (%) = tapped density – bulk density / tapped density × 100

Disintegration time- Disintegration time was determined using the disintegration apparatus USP (Electrolab, Bangalore, India) in 0.1N HCl for 2 h and then in phosphate buff er pH 6.8 maintaining the temperature at 37 ± 2°C [7].

Angle of Repose: The angle of repose of granules was determined by the funnel method. The accurate weight of powderwas taken in a funnel. The angle of repose is the highest stop angle of non- cohesive granular material. Angle of repose (θ) of the mucoadhesive microspheres measures the resistance to particles flow, and is calculated according to fixed funnel standing cone method [8].

Angle of Repose θ = tan-1 h/r

Where, h = height of the powder cone, r = radius of the powder cone

Hardness determination: Hardness signposts the capacity of a tablet to endure mechanical shudders while handling. Hardness of core tablets was indomitable using an endorsed dial type hardness tester. It is articulated in kg/cm2. Three tablets were erratically picked from respectively batch and considered for hardness. The mean and standard deviation were also premeditated [9].

Friability test: Friability is the loss of weight of pellets in the container/package, due to removal of fine particles from the surface. Roche Friabilator was used to measure the friability of the tablets. It was rotated at a rate of 25 rpm. 5 g pellets were weighed collectively and placed in the chamber of the friabilator[13]. In the friabilator, the pellets were exposed to rolling, resulting from free fall of pellets within the chamber of the friabilator. After 100 rotations (4 minutes), the pellets were taken out from the friabilator and intact pellets were again weighed collectively after removing fines using sieve # 44 sieve. Permitted percentage friability limit is 0.8%. The percent friability was determined using the following formula [10].

$$\%\textbf{Friability} = \textbf{Initialweight} - \textbf{Finalweight} \div \textbf{Initialweight} \times \textbf{100}$$

Stability Studies: Th e stability studies were carried out at 25°C ± 2°C / 60% ± 5% RH, 35°C ± 2°C / 60% ± 5% RH and 40°C ± 2°C / 75% ± 5% RH for selected formulations for 3 months [10]. Stability of lansoprazole OD tablets in artificial saliva and gastric juice is shown in Figure 3. Drug retention (%) in enteric granules exposed to artificial saliva and gastric juice in each formulation was approximately 100% [14].

Compatibility study of drug and polymer- IR study was performed to study compatibility between drug and polymer. Drug and polymers were mixed in 1:1 ratio after that mixer was placed on FTIR spectroscopy [11].

Swelling index- This technique was used for Characterization of sodium alginate microspheres. Different solution (100ml) was taken such as (distilled water, buffer solution of pH (1.2, 7.4) is taken and alginate microspheres (100mg) are placed in a Petridis and kept on the above solution and swelling is allowed at 37 0C for different time interval and changes in weight variation between initial weight of microspheres and weight due to swelling is measured by taking weight periodically and soaking with filter paper [12].

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Solubility- The solubility of a substance is the amount of that substance that will dissolve in a given amount of solvent. 1 gm of Lansoprazole is taken and dissolved in 10 ml of various solvents [15].

III. CONCLUSION

In conclusion, the present study has clearly demonstrated that compared to the conventional enteric-coated lansoprazole formulation. Lansoprazole is an acid labile drug; it degrades at acidic pH of stomach. To bypass stomach, the formulation has to delay the release and give the release in proximal small intestine. This can be achieved by enteric coating.The study includes preformulating of drug and excipients, formulation and evaluation, release kinetics and stability studies of capsules. The inert core material (i.e., Sugar sphere USP) was given, Drug coating, Sub coating (Barrier coating) and enteric coating.Lansoprazole enteric coated with Eudragit L30 D55 exhibited admirable physical resistance in gastric fluids and better drug release characteristics in intestinal fluids.Formulationimperilled for stability studies were patterned for physical appearance, disintegration test, drug content, related substances, and dissolution for 3months. The formulation was institute to be stable as no substantial change was perceived in the various evaluated constraints of the formulation.

REFERENCE

[1]. Bader B, Alsulays, Kulkarni Vijay, Sultan M. Alshehri et.al "Preparation and evaluation of enteric coated tablets of hot melt extruded lansoprazole" Drug Dev Ind Pharm. 2017 May; 43(5): 789–796. doi:10.1080/03639045.2016.1220567.

[2]. Fabio Baldia, Peter Malfertheiner et.al "Lansoprazole Fast Disintegrating Tablet: A New Formulation for an Established Proton Pump Inhibitor" Digestion 2003;67:1–5 DOI: 10.1159/000070393.

[3]. Donnellan C, Sharma N, Preston C, Moayyedi P. Medical treatments for the maintenance therapy of reflux oesophagitis and endoscopic negative reflux disease. Cochrane Database Syst Rev. 2005; CD003245.

[4]. Freston JW, Jackson RL, Huang B, Ballard ED. Lansoprazole for maintenance of remission of erosive esophagitis. Drugs. 2002;62: 1173–1184. doi:10.2165/00003495-200262080-00004.

[5]. Robinson M, Lanza F, Avner D, Haber M. Effective maintenance treatment of reflux esophagitis with low-dose lansoprazole. A randomized, double-blind, placebo-controlled trial. Ann Intern Med. 1996; 124:859–867.

[6]. Petchimuthu S, Narayanan N, UthirapathySubashini "Formulation and Characterization Of Lansoprazole Dr Pellets By Fluid Bed Coating Technique" International Journal of Biological & Pharmaceutical Research. 2013; 4(12): 977-986, e- ISSN 0976 – 3651.

[7]. S. Ramu, P. Chandra Gopal Reddy, Rao D. Srinivasa and Ramakrishna G. et.al, "Formulation And Evaluation Of Lansoprazole Delayed Release Pellets" International Journal Of Pharmaceutical, Chemical And Biological Sciences,2015, 5(4), ISSN: 2249-9504.

[8]. 8)Abhishek Mishra, Ahmad Dr. Shamim, Kumar Yogendra, KumarAnkul et.al, "Formulation And Evaluation Of Sustained Release Mucoadhesive Microspheres Of Lansoprazole Sodium" International Journal of Current Research Vol. 8, Issue, 02, pp.26846-26852 February, 2016, ISSN: 0975-833X.

[9]. Balaji M, Ramyakrishna N, Hanumanaik M et.al "Formulation Development and Characterization of Enteric Coated Tablets of Lansoprazole" Scholars Research Library der Pharmacia Lettre, 2020, 12 (3): 22-38, ISSN 0975-5071.

[10]. Nair Anroop B, Gupta Rachna, Kumari Rachna, Jacob Shery and Attimarad Mahesh "Formulation and Evaluation Of Enteric Coated Tablets Of Proton Pump Inhibitor" Journal of Basic and Clinical Pharmacy, September 2010.

[11]. Bhople, A., Chandewar, A. and Sheiakh, 2012. Formulation and development of mucoadhesive microcapsule for delivery of clarithromycin and omeprazole used against helicobacter pylori infection. Asian J Pharmacy and Life Sci., 2012; 2(1):27-48.

[12]. Gopferich, A., Alonso, M. J. and Langer, R. 1994. Development and characterization of mi croencapsulated microspheres. Pharm Research, 11(11):1568– 1574.

[13]. Thoma K, Bechtold K. Influence of aqueous coatings on the stability of enteric coated pellets and tablets. Eur J Pharm Biopharm. 1999; 47: 39–50.

[14]. Sumio Chono, Megumi Matsui, Katsuki Nakamura, and Ryoya Kasai et.al "Ingestibility and Formulation Quality of Lansoprazole Orally Disintegrating Tablets" Hindawi Publishing Corporation Journal of Pharmaceutics Volume 2016, Article ID 6131608, 6 pages.
[15]. Saltiel, E, Fask, A. 1999. Prevalence of potential proton-pump inhibitor drug interactions:A retrospective review of prescriptions in community pharmacies. Clin Ther., 21(10):1812-19.