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Research Article

EFFECT OF PH AND TIME ON THE DISSOLUTION STUDIES OF LANSOPRAZOLE

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ABSTRACT

Lansoprazole is proton pump inhibitor, used for the treatment of gastric ulcer. Due to its insolubility in water, studies are carried out to find the best dissolution medium & the effect of pH and time for the dissolution of Lansoprazole. Dissolution studies of Lansoprazole was determined in 0.1N HCl, distilled water and phosphate buffer of different pH i.e. 6.0, 6.8, 7.4 & 8.0. For phosphate buffer Increase in pH facilitated the dissolution of Lansoprazole and at pH 8.0, dissolution was maximum i.e. up to 90 % at 45 minutes. Dissolution is also affected by the ionic strength of the dissolution medium. Due to high ionic strength, phosphate buffer showed higher dissolution as compared to 0.1N HCl & distilled water. This procedure gives also same behavior with the four commercial samples. Released amount of active ingredient in commercial samples was maximum in the phosphate buffer solution at pH 8.0.

Keywords: Proton pump inhibitor, Dissolution, Gasrtoesophageal reflux drugs, HPLC, Lansprazole,

INTRODUCTION

Lansoprazole (Fig.1) is class of proton pump inhibitor which reduces the erosive esophagitis, active duodenal ulcer and gasrtoesophageal reflux disease[1-3]. Bioavailability and bioequivalence of drug is very important parameter for the quality of drug. A test report bioavailability and bioequivalence required for applying dosage form evaluation registration[4]. In vitro dissolution data is very important when estimating changes in production site and manufacturing studies[5-6]. A study was undertaken Lansoprazole to develop delayed release micropellet dosage form[7]. Another study carried out to enhance the dissolution of Lansoprazole using the solid dispersion[8].

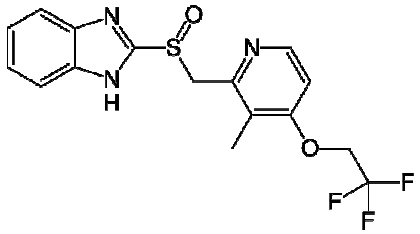

Fig. 1: Structure of Lansoprazole

Present study was carried out to find out the best dissolution medium for the dissolution lansoprazole among distilled water, 0.1 N HCl and phosphate buffer. Studies also prolong to evaluate the effect of different pH as well as dissolution time on the dissolution of lansoprazole.

MATERIALS AND MEHTODS

Materials

All the reagents and solvents used were of analytical grade. Solvent were dried before use.

Potassium dihydrogen phosphate, dipotassium hydrogen phosphate, sodium hydroxide and potassium hydroxide obtained from Sigma chemicals.

Instruments

pH is determined by using Cyber Scan pH meter. Spectrophotometric determinations carried out by UV-VISIBLE spectrophotometer (Techcomp-UV2300). Dissolution was determined by Erweka DT6 US. Released percentage of drug was determined by HPLC (Shimadzu LC-10A US).

Methods

All method employed were according to the standard procedures. Drug estimation was carried out by HPLC method. Using triethylamine, water, acetonitrile (1:60:40) mobile phase with flow rate of 1.0ml per min adjusted pH to 6.2 using, C-18 column used, UV detector analyzed at wavelength of 284nm[9].

Validity on Commercial Samples

To show the effectiveness of change in the pH and nature of the solvent, this method was employed on the commercially available samples. Four different brand samples of local pharmaceutical companies were collected from market (available as granules in capsule). These were available in the form of 30mg capsule. These four brands were Agopton, Lansor, Lanzit and Lanzol. These samples solutions were prepared according to the standard procedures.

RESULTS AND DISCUSSION

In order to evaluate the quality of the drugs, basic parameters of drugs needs to be determined. These parameter helps up to estimate the quality of dugs according to limit given by USP. Dissolution profile of the lansoprazole was determined in the different dissolution medium. Dissolution profile in the table 1 mentioned that 0.1N HCl has very less dissolution value. Even though increase in the dissolution time has no significant effect on dissolution of lansoprazole. However distilled water showed better results for dissolution as compared to 0.1N HCl but even these results were not convincing enough for dissolution studies.

Buffer solutions of pH 6.0 showed significant increase in dissolution time as compared to results shown by 0.1N HCl & Distilled water. Results in Table1 also showed that with increase in digestion time, dissolution of Lansoprazole increases i.e. with phosphate buffer of pH 6.0 dissolution of Lanzoprazole increased from 9% at 5min up to 49% at 45 minute time.

Table 1 also shows that increase in pH of dissolution medium also result in an increase in dissolution i.e. an increase in pH of phosphate buffer from 6.0 to 8.0 resulted in an increase in dissolution of Lansoprazole from 9% to 68% respectively @ 5 minute digestion time.

Results of study also showed that digestion time also has encouraging effect on dissolution of Lansoprazole i.e. dissolution of Lansoprazole increases significantly with an increase in digestion time. Results in Table1 show that in dissolution medium of phosphate buffer of pH 8 dissolution of Lansoprazole increased from 68% at 5minute dissolution time to 98% at 45minute dissolution time.

Increase in the dissolution is also associated with the increase in the ionic strength. In case of Lansoprazole percentage drug release in different dissolution media vary due to difference in ionic strength. Phosphate buffer has high ionic strength as compared to the distilled water and 0.1N HCl.

Results obtained from commercial samples as given in Table 2 & 3 showed similar results as results obtained through standard procedure i.e. with increase in pH from 6.0 to 6.8, dissolution of commercial sample Agopton increased from 10% to 45% at 5minute dissolution time. Results from Table 2 & 3 also shows that similar to standard procedure, with increase in dissolution time drug release also increases i.e. with phosphate buffer of pH 8 drug release of commercial sample Lansor increased from 26% at 5minute dissolution time to 95% at 45minute dissolution time. Results of other companies samples were also closely related and with in the range of British Pharmacopeias.

Table 1: Effect of dissolution time and dissolution medium for standard sample

Dissolution Media	5 minutes	15 minutes	30 minutes	45 minutes
Phosphate Buffer pH 6.0	9	21	23	49
Phosphate Buffer pH 6.8	29	40	49	64
Phosphate Buffer pH 7.4	57	63	66	72
Phosphate Buffer pH 8.0	68	80	85	98
0.1N HCl	0.2	0.7	5	9
Distilled Water	2	8	14	17

Table 2: Effect of dissolution time and dissolution medium for Commercial samples at 5 and 15 minutes

Dissolution Media	5 minutes				15 minutes			
	Agopton	Lansor	Lanzit	Lanzol	Agopton	Lansor	Lanzit	Lanzol
Phosphate Buffer pH 6.0	10	6	11	3	27	26	25	13
Phosphate Buffer pH 6.8	17	11	17	9	40	33	45	25
Phosphate Buffer pH 7.4	27	32	35	12	48	52	55	35
Phosphate Buffer pH 8.0	42	26	31	16	68	66	72	47
0.1N HCl	0.1	0.1	0.2	0.1	0.4	0.5	0.8	0.06
Distilled Water	3	5	4	4	6	8	6	7

Table 3: Effect of dissolution time and dissolution medium for Commercial samples at 30 and 45 minutes

Dissolution Media	30 minutes				45 minutes			
	Agopton	Lansor	Lanzit	Lanzol	Agopton	Lansor	Lanzit	Lanzol
Phosphate Buffer pH 6.0	35	32	39	33	46	44	46	42
Phosphate Buffer pH 6.8	52	45	54	49	61	61	60	62
Phosphate Buffer pH 7.4	61	63	61	68	74	70	76	80
Phosphate Buffer pH 8.0	78	85	83	72	90	95	88	86
0.1N HCl	5	6	6	5	7	9	10	8
Distilled Water	13	15	12	14	17	19	16	19

CONCLUSION

Study was under taken to aim the effect of pH and dissolution time on the dissolution of lansoprazole, which is a benzimidazole anti ulcer agent and is one of the widely used drugs for treating mild and severe ulcers of esophagus and duodenum. Researchers are always in the effort to enhance the availability of drug inside the body. Some scientist utilized the solid dispersion medium to increase the drug release. Presently work focuses on a method to increase the dissolution of important gastric ulcer lowering drug by applying the buffer solution of pH-8. At this pH drug release was maximum and available for their respective action inside the body. Commercial samples were also giving us similar results.

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