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Research Article

METHOD DEVELOPMENT AND VALIDATION OF DIFFERENCE UV SPECTROPHOTOMETRIC ESTIMATION OF LAFUTIDINE IN BULK AND PHARMACEUTICAL DOSAGE FORM.

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ABSTRACT

A simple, precise and sensitive UV spectrophotometric method has been developed for estimation of Lafutidine in bulk and pharmaceutical dosage form by difference spectrophotometric method. This method is based on principle that Lafutidine shows two different forms in acidic and basic medium. Lafutidine exhibited maximum and minimum absorbance at about 288nm and 264nm in acidic and basic solution. Beer's law was obeyed in range of 5-25µg/ml. The correlation coefficient was found to be 0.9980.The result of Interday and intraday precision shows standard deviation ranging from 0.093-0.61 and 0.1873-0.2447 respectively for three concentration, three replicate. The accuracy was found to be 99.52%-100.057%. The purposed method was successfully applied for the determination of Lafutidine in tablet dosage form. The method was successfully validated according to ICH guidelines.

Keywords: Lafutidine, Difference spectrophotometric.

INTRODUCTION

Lafutidine, chemically 2-[(2-furylmethyl)sulfinyl]-*N*-((2*Z*)-4-{[4-(piperidin-1- ylmethyl) pyridin-2-yl] oxy} but-2-en-1-yl) acetamide (figure 1) is H_2-receptor antagonist used in the treatment of peptic ulcer and gastro-esophageal reflux disease (GERD) [1].Being histamine H_2 (receptor antagonist, it inhibits daytime (i.e., postprandial) as well as nighttime gastric acid secretion. It also has gastro protective activity that particularly affects mucosal blood flow. It elevates postprandial intragastric pH and increases plasma calcitonin gene-related peptide and somatostatin concentrations in humans.

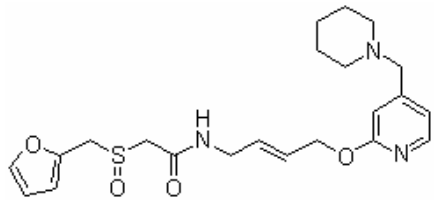


Fig. 1: Structure of Lafutidine

The literature reveals that there are some of the methods had been performed for Lafutidine i.e. Determination of lafutidine in human plasma by HPLC-MS[4], Determination of lafutidine in human serum by HPLC-FD method and study of pharmacokinetics[5], Simple, sensitive and rapid LC-ESI-MS method for quantification of lafutidine in human plasma[6], Determination of Lafutidine in serum with reverse high performance liquid chromatography[7], Determination of residual organic solvent in lafutidine by GC[8], Determination of related substance in lafutidine by RP-HPLC[9], Determination of lafutidine and its tablets by HPLC method[10], Determination of lafutidine and its tablet by rp-HPLC[11], uv spectroscopic method determination of lafutidine in its tablet dosage form[12], No difference spectrophotometric method has been developed for Lafutidine. The purpose of this work was to develop and validate simple, specific, sensitive, accurate, precise UV Difference spectroscopic method for the estimation of lafutidine in bulk and its tablet dosage formulations.

MATERIALS AND METHODS

Materials

Lafutidine working standard was procured as a gift sample from Ajanta Pharma Ltd.,

Mumbai. Tablet formulations of Lafutidine (Lafudac 10 mg) manufactured by Unichem Pharma. Ltd., Mumbai was purchased from local market.

Chemicals and reagents

All chemicals were of analytical grade. Double distilled water was obtained by in house distillation. AR grade Methanol was obtained from Astron Chemicals, India and AR grade Sodium Hydroxide was obtained from RFCL Ltd., India. AR grade Hydrochloric acid was obtained from Astron, Ahmadabad, India. Freshly prepared 0.01 N sodium hydroxide and 0.01 N hydrochloric acid is of analytical grade were used in the present investigation.

Instrumentation

A shimadzu1800 UV visible double beam spectrophotometer with 10mm matched quartz cuvettes were used for spectral measurements. A high precision balance was used for weighing the reagents. Ultrasonication was used for solubiliztion of drug.

Preparation of stock solution

The standard stock solution of Lafutidine was prepared by dissolving 10 mg drug in 10 ml methanol which gives 1000µg/ml concentration. from that 100 µg/ml solution of Lafutidine was prepared by taking 5ml of above solution into two separate 50 ml volumetric flasks and were diluted up to the mark with 0.01 NHCL and 0.01N NaOH.

Preparation of calibration curve

Different aliquots were taken from the 100 µg/ml of Lafutidine stock solution in separate 10ml volumetric flask and finally diluted with 0.01 N NHCL and 0.01N NaOH solution to prepare a series of concentration ranging from 5-25 µg/ml as reference and test solution. The difference spectrum for Lafutidine was recorded by placing drug in 0.01 N NaOH in reference cell and 0.01 N HCL in sample cell. The difference in absorbance between 288nm (maxima) and 264nm (minima) was calculated to find out the amplitude. Calibration curve was plotted by taking concentration of drug on X-axis and amplitude in Y-axis. The difference UV absorbance spectrum of Lafutidine in 0.01 N HCL and 0.01 N NaOH was shown in Figure 2 and Figure 3.The overlain spectrum of Lafutidine is shown in Figure 4. Calibration curve of Lafutidine is shown in figure 5.

Analysis of commercial dosage form

Twenty tablets were weighed and powdered finely. A quantity of tablet powder equivalent to 10 mg of Lafutidine was accurately weighed and transferred to 10 ml volumetric flak and sonicated for 10 min. The solution was further filtered by whattmann filter paper. The solution was further diluted with 0.01 N HCL and 0.01 N NaOH to get the required concentration of 10µg/ml. The amount of drug

present in the sample solution was determined using the calibration curve of standard drug.

Method validation

The developed method was validated for linearity, accuracy, precision, repeatability, limit of detection, limit of quantification.to check the accuracy of the proposed method, recovery studies were carried out by spiking 50%, 100% and 150% of test concentration. The interday and intraday precision of the method was ascertained by taking three concentration, three replicate within beer's range and finding out the amplitude by the method. The %RSD was calculated.

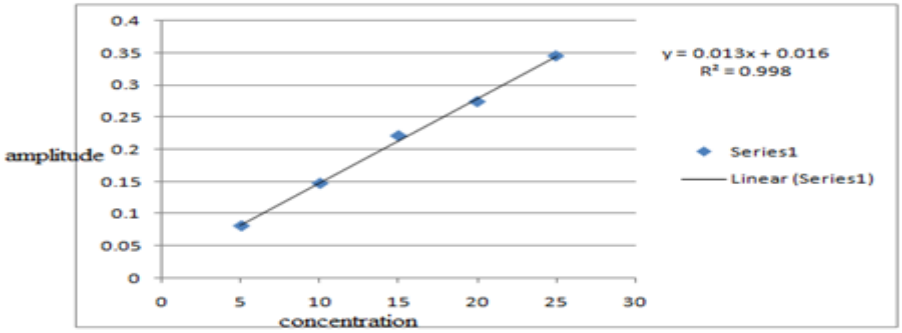


Fig. 5: Calibration curve of Lafutidine

Table 1: Accuracy of lafutidine

%spiking	Tablet concentration (µg)	Standard concentration(spiked) (µg)	%recovery	%RSD
0	10	0	99.86±0.20	0.1532
50	10	5	99.56±0.12	0.1157
100	10	10	99.53±0.16	0.1030
150	10	15	98.94±0.30	0.2103

Table 2: Optical characteristic and validation parameter of Lafutidine

Parameter	Value
Wavelength	288nm(maximum) 264(minimum)
Linearity	5-25 µg/ml
Correlation coefficient	0.9980
Slope	0.012
Intercept	0.020
LOD	0.19µg/ml
LOQ	0.59µg/ml
Precision	
Interday(n=3)	0.093-0.61
Intraday(n=3)	0.1873-0.2447

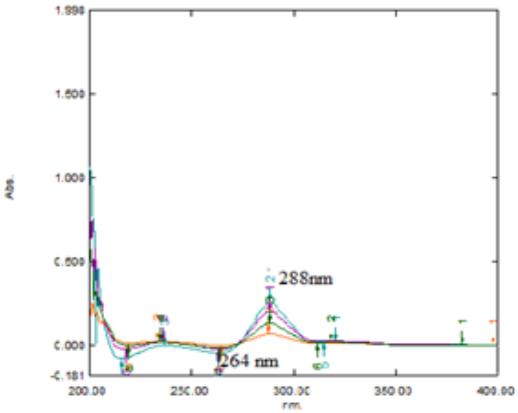
Table 3: Analysis of tablet dosage form

S. No.	Brand name	Actual Amount	Amount estimated	Average	% RSD	% recovered
1			9.88 µg			
2	Lafudac	10µg/ml	9.90 µg	9.885	0.102094	98.86±0.15
3			9.87µg			

RESULT AND DISCUSSION

A simple, precise and accurate difference spectrophotometric method has been developed for the estimation of Lafutidine in formulation. In this method the measured value is the difference in absorbance between two equimolar solutions of the analyzed in different chemical forms which exhibit different spectral characteristics. The difference spectrum of lafutidine in 0.01N HCl was recorded by taking lafutidine in 0.01N NaOH as blank. The difference spectrum showed that the maxima at 288nm and minima at 264 nm. Calibration graphs were constructed covering a concentration range 5-25 µg/ml. Linear relation-ships between amplitude of maxima and minima of difference spectra verses the corresponding drug concentrations were observed. The standard deviation of the slope and the intercept were low. The correlation coefficient exceeded 0.9980.The mean percent label claims estimated for the formulation was 98.86%.

This value is very close to 100 indicating the accuracy of the proposed method. The mean percent recovery were within the range of 99.53 to 99.94%.Thus it is concluded that the proposed method of analysis is new, simple, cost effective, accurate and reproducible and this method can be successfully employed in the routine analysis of lafutidine in tablet formulation.



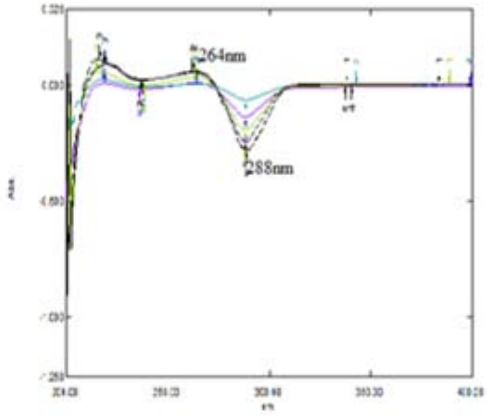


Fig. 2: Spectrum of Lafutidine in Fig. 3: Spectrum of lafutidine in 0.01 N HCl 0.01 N NaOH

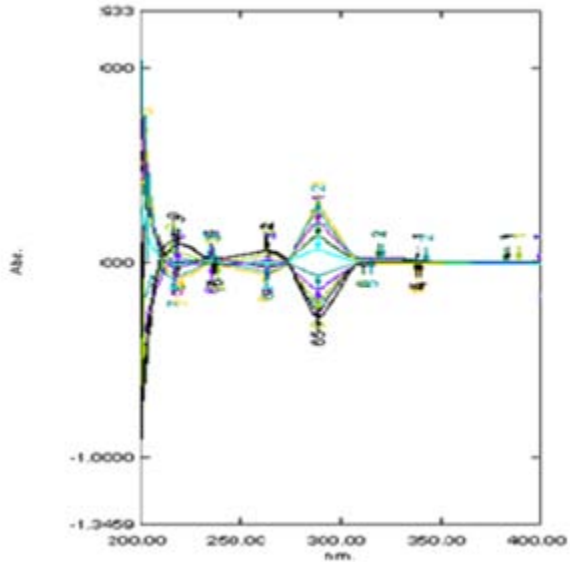


Fig. 4: Overlain spectra of lafutidine in 0.01 N HCl and 0.01 N NaOH

CONCLUSION

A new, simple and selective difference spectroscopic method was developed for the analysis of lafutidine in bulk and in pharmaceutical formulation. In this method the difference in amplitude of drug in 0.01 N HCl and 0.01 N NaOH was measured at 288 nm and 264nm.The developed method was also validated and from the statistical data, it was found that method was accurate, precise, reproducible and can be successfully applied to the pharmaceutical formulation without interference of excipients.

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