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SIMULTANEOUS ESTIMATION OF OFLOXACIN AND CEFPODOXIME PROXETIL IN PHARMACEUTICAL DOSAGE FORM BY UV SPECTROPHOTOMETRIC METHOD

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ABSTRACT

A simple, precise, accurate, rapid and economical spectrophotometric method have been developed for simultaneous estimation of Ofloxacin and Cefpodoxime proxetil in pure and in combined Tablet dosage form. Simultaneous equations method by using 293 nm and 263 nm as absorbance maxima (λmax) for Ofloxacin and Cefpodoxime proxetil respectively.0.1 M HCL as a Solvent. Linearity was observed in the concentration range of 2-10 µg/ml for Ofloxacin and 2-10µg/ml for Cefpodoxime proxetil respectively. The method was validated statistically and recovery study was performed to confirm the accuracy of the method.

INTRODUCTION

Ofloxacin (OFLO) is chemically 9-fluro-2-3 dihydro-3-methyl-10- (4-methyl 1-piperazinyl) - 7-oxo-7H- pyrido [1, 2, 3-de] 1, 4 benzoxazine-6-carboxylic acid[1] (Figure 1) is a fluoroquinolone antibacterial used in the treatment of chalmydia or chlamydophila infections including nongonococcal urethritis and in mycobacterial infections such as leprosy. It is official in IP, BP and USP. IP, BP and USP describe potentiometry method for itsestimation.

Cefpodoximeproxetil (CEFPO) is chemically 1-(isopropoxycarbonyloxy) ethyl(6R,7R)-7-[2-(2-amino-4-thiazolyl)-(z)-2-(methoxyimino)acetamido]-3-methoxymethyl-3-cephem-4-carboxylate is a third generation cephalosporin antibiotic used for infections of the respiratory tract, urinary tract and skin and soft tissues. Cefpodoximeproxetil is official in IP and USP. IP and USP describe liquid chromatography method for its estimation.

Asurvey of literature revealed that few chromatographic and Spectrophotometricmethods are reported fordetermination Ofloxacin and Cefpodoximeproxetil individually and with other drug combination. The present work describe simple, precise, accurate and economical spectrophotometric method have been developed for simultaneous estimation of Ofloxacin and Cefpodoximeproxetilform combined dosage form.

MATERIAL AND METHOD

Instrument

A shimadzu model 1700 (Japan) double beam UV/Visible spectrophotometer with spectral width of 2 nm, wavelength accuracy of 0.5 nm and a pair of 10 mm matched quartz cell was used to measure absorbance of all the solutions.

Reagents and Chemicals

Reference Standards of Ofloxacin and Cefpodoxime Proxetilwere obtained as gift samples from the Cadila Pharmaceutical Ltd and Montage lab pvt. The drug sample (Tablets) ZEDOCEF - O by macleods pharmaceutical ltd were procured from market. All other reagents were of analytical grade for Spectrophotometric method.

Procedures

Preparation of Standard Stock Solution and Calibration curve:

Standard stock solution of pure drug containing 1000 µg/ml of Ofloxacin and 1000µg/ml of Cefpodoxime Proxetil were prepared in 0.1 M HCL and final volume was adjusted with same

solvent to get 1000 µg/ml of each drug. From the above solution prepare 100µg/ml solution for both drugs using 0.1 M HCL. Working standard solution of 10 µg/ml were scanned in the entire UV range 2000-200nm to determine the λ max of both drug. The λmax of Ofloxacin and Cefpodoximeproxetil is 293 nm and 263 nm respectively. Five working standard solution with concentration 2,4,6,8,10µg/ml of Ofloxacin and 2,4,6,8,10µg/ml of Cefpodoxime proxetil. The absorbance of resulting solution were measured at their respective λmax and plotted a calibration curve to get linearity and regression equation.

Simultaneous Equation Method

The Simultaneous Equation Method of analysis based on the absorption of the drugs Ofloxacin and Cefpodoximeproxetil at their λmax. Two wavelength selected for the development of Simultaneous Equation are 293nm (λ1) and 263nm (λ2)absoptivities of both the drugs at both the wavelengths were determined.The equations obtained for the estimation of concentration were,

$$Cx = \frac{A_2 ay_1 - A_1 ay_2}{ax_2 ay_1 \quad ax_1 ay_2}$$

$$Cy = \frac{A_1 ax_2 - A_2 ax_1}{ax_2 ay_1 \quad ax_1 ay_2}$$

WhereA1 and A2 are absorbance of Sample solution at 293 and 263 nm respectively.
ax1= Absorptivity of Ofloxacin at 293 nm

ax2 = Absorptivity of Ofloxacin at 263 nm

Ay1 = Absorptivity of Cefpodoximeproxetil at 293 nm

Ay2= Absorptivity of Cefpodoximeproxetil at 263 nm

C_X andC_Y are concentration of Atorvastatin and Cefpodoximeproxetil in sample solution.

Procedure for Tablet formulation

Twenty Tablets were accurately weighed, and contents were removed. Average weight of the content per Tablet was calculated. The contents of a Tabletwere reduce to fine powder. A quantity ofTablet powder equivalent to 200mg of Ofloxacin and 200mg of Cefpodoximeproxetil was transferred to 100ml volumetric flask and dissolved in 0.1 M HCL,sonicated for 20 min then filtered through Whatman filter. The Aliquot portion of filtrate was further diluted to get a final concentration of about 4µg/ml Ofloxacin and 4µg/ml of Cefpodoximeproxetil. For Simultaneous equation method .The absorbance of sample solution was measured at 293nm and 263nm in 1cm

cell against the blank. The content of Ofloxacin and Cefpodoximeproxetil in a Tablet was calculated by the simultaneous equation method.

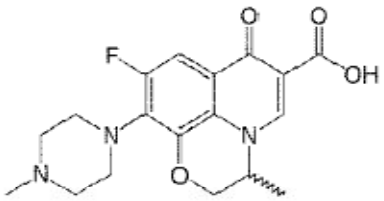

Fig. 1: Chemical structure of ofloxacin

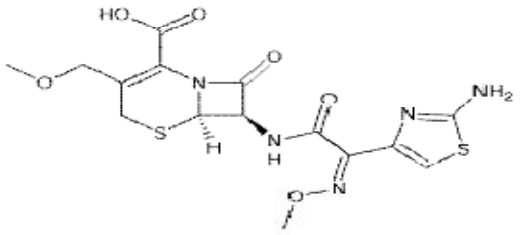

Fig. 2: Chemical structure of cefpodoxime proxetil (CEFPO)

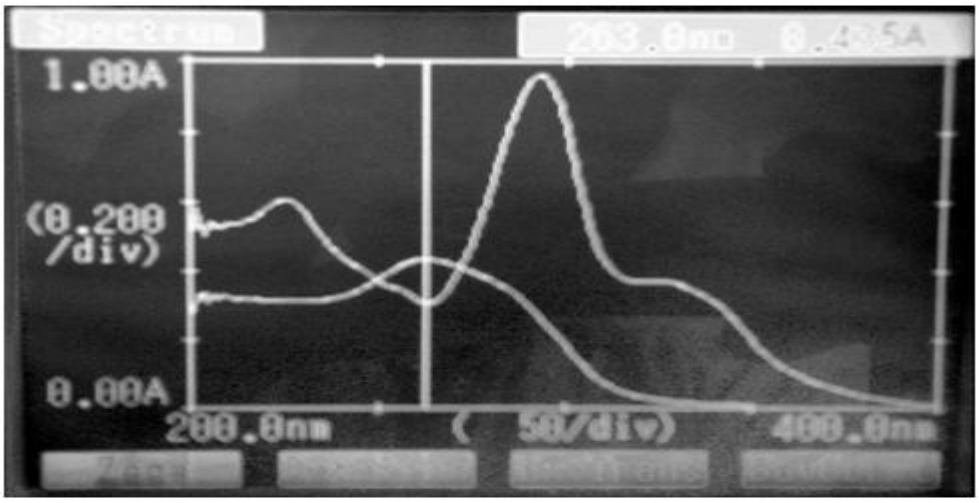

Figure-3 Overlain spectra of Ofloxacin (10µg/ml) and Cefpodoximeproxetil (10µg/ml)

Table-1Optical Characteristic:

(Simultaneous equation method)				
Parameters	**Ofloxacin**		**Cefpodoxime proxetil**	
Wavelength	293	263	293	263
Beer's law limit	2-10	2-10	2-10	2-10
Regression equation	y=0.0885x+ 0.0715	y = 0.0255x + 0.0022	y = 0.0224x - 0.078	y = 0.0373x - 0.0095
Correlation coefficient (r^2)	0.998	0.998	0.998	0.998
LOD (µg /ml)	0.20	0.28	0.24	0.13
LOQ (µg /ml)	0.62	0.87	0.75	0.42

Table-2 Results of the recovery studies

Level of recovery %	Amount of pure drug added (µg/ml)		Simultaneous equation method % recovery	
	OFLX	CEFPODO	OFLX	CEFPODO
80	3.2	3.2	98.33	90.50
100	4	4	101.25	98.75
120	4.8	4.8	99.31	99.0
% recovery			99.9	99.0
%RSD			1.13	0.25

* RSD=Relative Standard deviation

Table-3 Results of analysis of Tablet formulation

Drugs	Simultaneous equation method
	%Assay ± SD (n=6)
Ofloxacin (200mg)	100.25% ± 0.95
Cefpodoxime proxetil (200mg)	98.25% ± 0.45

Validation of the Method according to ICH Guidelines

Validation of the method was done according to ICHguidelines for Simultaneous Equation method.

Linearity

The linearity of the method is its ability to elicit test results that are directly proportional to the concentration of the analyte in the samples. OFLX was linear with the concentration range of 2-10µg/ml at 293 nm. CEFPODO showed the linearity in the range of 2 – 10µg/ml at 263nm.

Precision(repeatability)

The repeatability of the method was confirmed by the analysis of formulation was repeated for 6 times with the same concentration.

Intermediate precision(reproducibility):

The intraday and interday precision of the proposed method was determined by analyzing the corresponding responses 3 times on the same day and on 3 different days 3 different concentrations of standard solutions of OFLX and CEFPODO.

Accuracy (recovery study):

To check the accuracy of the proposed methods, recovery studies carried out at 80%, 100%, and 120% of the test concentration as per ICH Guideline. The recovery study was performed three times at each level.

Limit of detection and Limit of quantification:

The limit of detection (LOD) and the limit of quantification (LOQ) of the drug were derived by calculating the signal-to-noise ratio (S/N) using the following equations designated by International Conference on Harmonization (ICH) guidelines.

$LOD = 3.3 \times \sigma/S$, $LOQ = 10 \times \sigma/S$

Where, σ = the standard deviation of the response and S = slope of the calibration curve.

RESULTS AND DISCUSSION

In this method, two wavelengths were used for the analysis of the drugs. 293 nm (λmax of OFLX) and 263 nm (λmax of CEFPODO) are the wavelengths at which calibration curves were prepared for both the drugs. Linear correlation was obtained between absorbances and concentrations of OFLX and CEFPODO in the concentration ranges of 2-10µg/ml and 2-10µg/ml for both drugs respectively. The linearity of the calibration curve was validated by the high values of correlation coefficient of regression. LOD and LOQ values for OFLX were found to be 0.20 and 0.62µg/ml and 0.28 and 0.87µg/ml at 293 and 263 nm respectively. LOD and LOQ valuesfor CEFPODO were found to be 0.24 and 0.75 µg/ml and 0.13 and 0.42µg/ml at 293 and 263 nm respectively These data show that method is sensitive for the determination of OFLX and CEFPODO. Both drugs showed good regression values at their respective wavelengths, and the results of a recovery study revealed that any small change in the drug concentration in the solution could be accuray determined by the proposed method.The proposed validated method was successfully applied to determine OFLX and CEFPODO in their combined dosage form. The results obtained for OFLX and CEFPODO were comparable with the corresponding labeled amounts (Table-3).

CONCLUSION

The proposed methods are simple, rapid and validated in terms of linearity, precision, accuracy, reproducibility, and can be used successfully for routine simultaneous estimation of Ofloxacin and Cefpodoximeproxetil in pure and Tablet dosage forms.

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