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Analytical Method Development and Validation for the Simultaneous Estimation of Cefixime Trihydrate and Ornidazole in Combined Dosage form by UV-Spectrophotometric Method

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ABSTRACT

A Simple, precise, accurate and economical UV-spectrophotometric method has been developed and validated for simultaneous estimation of Cefixime trihydrate (CEF) and Ornidazole (ORD) in combined dosage form. In simultaneous equation method, CEF and ORD were quantified using their absorptivity values at selected wavelengths 288 nm and 311 nm respectively. The linearity range was found to be 5-50 µg/ml for CEF and 5-50 µg/ml for ORD. Different analytical parameters such as linearity, precision, accuracy, limit of detection (LOD) and limit of quantification (LOQ) were determined as per ICH guidelines. Limit of detection and quantification values CEF 1.10 and 3.33 µg/ml and for ORD 1.58 and 4.79 µg/ml respectively. The recovery values between prescribed limit of 98-102% shows that method is free from interference of excipients present in formulation. The developed method was free from interferences due to excipients present in formulation and it can be used for routine quality control analysis.

Keywords: Cefixime trihydrate (CEF) and Ornidazole (ORD), Simultaneous equation Method.

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INTRODUCTION

Cefixime (CEF) is an oral third generation cephalosporin antibiotic. Chemically, it is (6R,7R)-7-{[2-(2-amino-1,3-thiazol-4-yl)2(carboxymethoxyimino)acetyl]amino-3ethenyl-8-oxo-5-thia-1-azabicyclo-[4.2.0]oct-2-ene-carboxylicacid, clinically used in the treatment of susceptible infections including gonorrhoea, otitismedia, pharyngitis, lower respiratory-tract infections such as bronchitis, and urinary-tract infections[1].

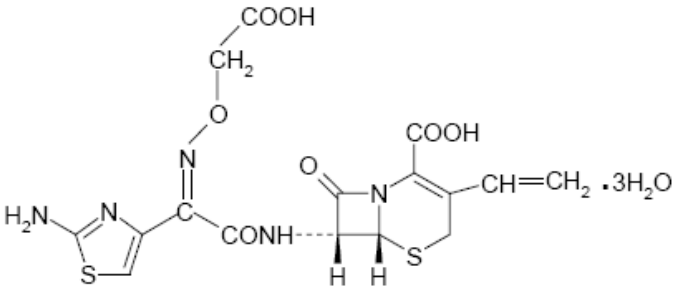

Figure 1: Structure of Cefixime Trihydrate

Ornidazole[7-8] (ORD), chemically 1-chloro-3-(2-methyl-5-nitro-imidazol-1yl)propan-2-ol, is an antimicrobial agent used in treatment of susceptible protozoal infections and anaerobic bacterial infection[2].

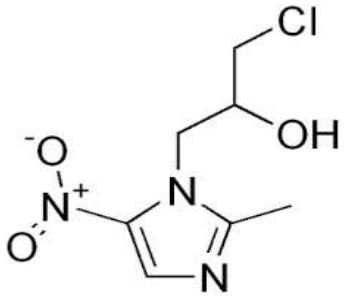

Figure 2: Structure of Ornidazole

Both the drugs are marketed as combined dose tablet formulation in the ratio of 200:500mg CEF: ORD. Literature survey revealed that there are few methods reported for the simultaneous estimation of these drugs, individually or with other drugs UV-spectrophotometry,[3-6] RP-HPLC[9] are available. Hence present study aim to developing a precise, linear, simple, rapid, validated and cost effective. UV- spectrophotometry method for the simultaneous estimation of these drugs in combined dosage forms.

MATERIALS AND METHOD

Instruments Used

SHIMADZU double beam UV/Visible Spectrophotometer model UV 1800s was employed with a spectral band width of 1nm and a wavelength accuracy of 0.3 nm (with automatic wavelength

correction with a pair of 1cm matched quartz cells). SHIMADZU Electronic balance model AX 200 and Ultra Sonicator (Fast clean) model 2k811056 were also used during the analysis. Analytically pure samples of CEF and ORD were obtained as gift samples from Chandra labs (Hyderabad).Tablets of brand "TAXIM-OZ" having combination of CEF (200mg) and Ornidazole (500mg) manufactured by alkem laboratories LTD. was purchased from local pharmacy.

Selection of Solvent and Wavelength

The UV spectra of Cefixime trihydrate (CEF) and Ornidazole (ORD) in different solvents like water, acetonitrile, methanol and ethanol were recorded. The two drugs showed good absorbance when dissolved in methanol. Hence methanol was selected as the solvent for the method. In this the two drugs showing good absorbances and wavelengths 288 nm and 311 nm were selected as the λ_{max} of CEF and ORD respectively. Simultaneous equation method was developed for the estimation of CEF and ORD in the combined dosage form. The normal overlain spectra of CEF and ORD in methanol was shown in the figure 3.

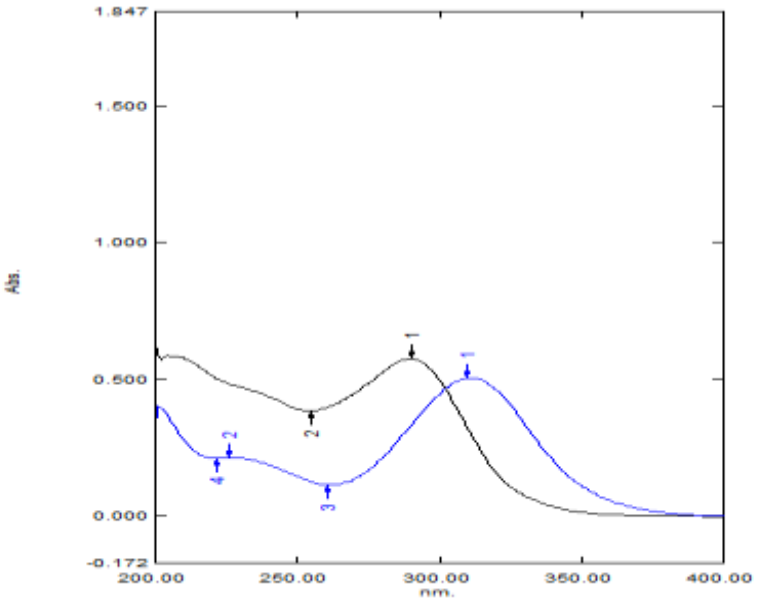

Figure 3: Overlain normal spectra of Cefixime trihydrate (10 µg/ml) and Ornidazole (10 µg/ml) in methanol

Preparation of Standard Solutions

CEF and ORD (10 mg each) were separately weighed and transferred to a 10 ml volumetric flask and both the drugs were dissolved in methanol to get a solution of 1000µg/ml. 100 µg/ml standard solutions were prepared by diluting 1ml of standard solution (1000 µg/ml) to 10ml with

methanol.

Preparation of Working Standard Solutions

The working standard solutions of 5-50 µg/ml for CEF and ORD were prepared by diluting 0.5 ml, 1ml, 1.5ml, 2ml up to 5ml of 100 µg/ml of standard solution of CEF and ORD to 10ml with methanol and scanned these solutions in the range 400 nm-200 nm to obtain the absorbance spectra. The absorptivity values were determined at the two selected wavelengths. The concentration of two drugs in the mixture was calculated using the following equation.

$C_{CEF=}A_2ay_1\text{-}A_1ay_2/ax_2ay_1\text{-}ax_1ay_2$

$C_{ORD=}A_1ax_2\text{-}A_2ax_1/ax_2ay_1\text{-}ax_1ay_2$

Where $C_{CEF,}$ C_{ORD} are the concentrations of CEF and ORD in mixture and in sample solutions. $A_{1,}$ A_2 are the absorbance's of sample at 288 nm and 311 nm respectively, $ax_{1,}ax_2$ are the absorptivity values of CEF at 288 nm and 311 nm ,$ay_{1,}ay_2$ are the absorptivity of Ornidazole at 288nm and 311 nm respectively.

Preparation of Sample Solutions

Twenty Taxim-oz tablets each containing 200mg of Cefixime trihydrate, 500mg of Ornidazole were weighed, average weight was calculated and powdered. A quantity equivalent to 50mg of ORD was weighed and transferred in to 10ml volumetric flask. It was extracted with methanol. The volumetric flask was sonicated for 5 mins to affect the complete dissolution of the drugs and the solution was made up to the volume with methanol to obtain concentration of 5000 µg/ml and filtered. This solution was further diluted with methanol to get a solution having concentration of 10 µg/ml of ORD and 4 µg/ml of CEF.

RESULTS AND DISCUSSION

Method Development

The analytical method was developed using Simultaneous Equation Method by taking 288 nm and 311 nm as λ_{max} of CEF and ORD respectively. For the tablet dosage form the % assay was found to be 100.05 of CEF and 99.98% of ORD (Figure.4) (Table 2).

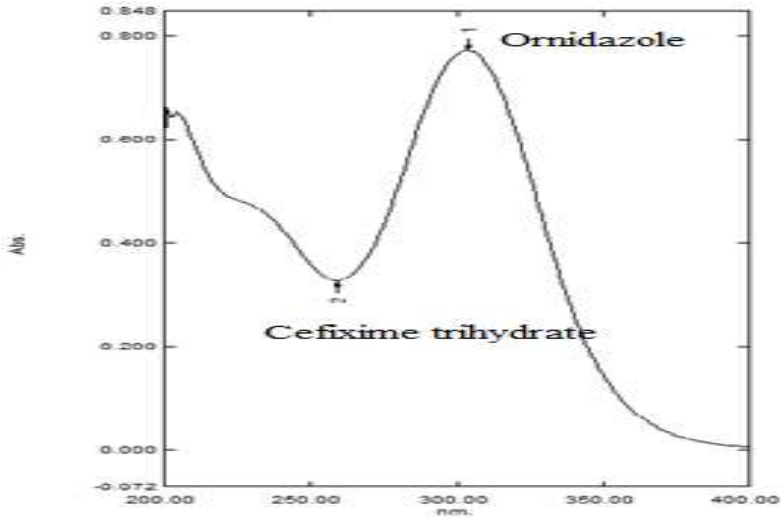

Figure 4: UV Spectra of Cefixime Trihydrate and Ornidazole in Formulation

Method Validation

The analytical method was validated with respect to parameters such as linearity, precision, accuracy, limit of detection (LOD), limit of quantification (LOQ).

Linearity and Range

Linearity was established by least squares linear regression analysis of the calibration curve. The calibration curves were linear over the concentration range of 5-50 µg/ml for CEF, 5-50 µg/ml for ORD. Absorbances were plotted versus respective concentrations and linear regression analysis was performed on the resultant curves. Correlation coefficients were found to be 0.999 for both CEF and ORD (Figure 5 and Figure 6).

Precision

The precision of the analytical method was studied by multiple sampling of the homogenous sample. The precision was done at two levels (intraday and inter day). Intraday precision was done by analyzing the intermediate concentration of each drug (CEF 4 µg/ml and ORD 10 µg/ml) for six times. Interday precision was measured over three consecutive days for the same drug concentrations. The %RSD values were found to calculated for each of them and the low RSD values indicate that the method is precise. The results were found within 2% limit. The results are given in Table.1.

Accuracy

Recovery studies were carried out by spiking the sample solution with standard solutions of CEF and ORD at 80, 100 and 120%. At each level % recovery was determined three times. The results were found within the limit (98-102%). The results are given in Table 1.

Sensitivity

LOD and LOQ decide about the sensitivity of the method. LOD is the lowest detectable concentration of the analyte by the method while LOQ is the minimum quantifiable concentration. LOD and LOQ were calculated by standard calibration curves. LOD and LOQ were found to be 1.10 µg/ml, 3.33 µg/ml for CEF and 1.58 µg/ml, 4.79 µg/ml for ORD. The results are given in Table.1.

Table 1: Summary of Validation Parameters

Parameters	Cefixime Trihydrate	Ornidazole
Linearity range (µg/ml)	5-50	5-50
Correlation coefficient	0.9996	0.9991
Slope	0.0531	0.049
Intercept	0.0019	0.0195
LOD (µg/ml)	1.101	1.58
LOQ(µg/ml)	3.336	4.79
Recovery (%)		
80	99.4%	99.5%
100	101.5%	100.5%,
120	99.2%	101.9%
Precision (RSD %)		
Intraday (n=6)	0.826	0.577
Interday (n=6)	0.526	0.418

Table 2: Analysis of Marketed Formulation

Drug	Amount Labeled (mg)	Amount	% Assay	%RSD Found (mg)
Cefixime trihydrate	200	200.1	100.05	0.65
Ornidazole	500	499.9	99.98	0.89

*Mean of three observations

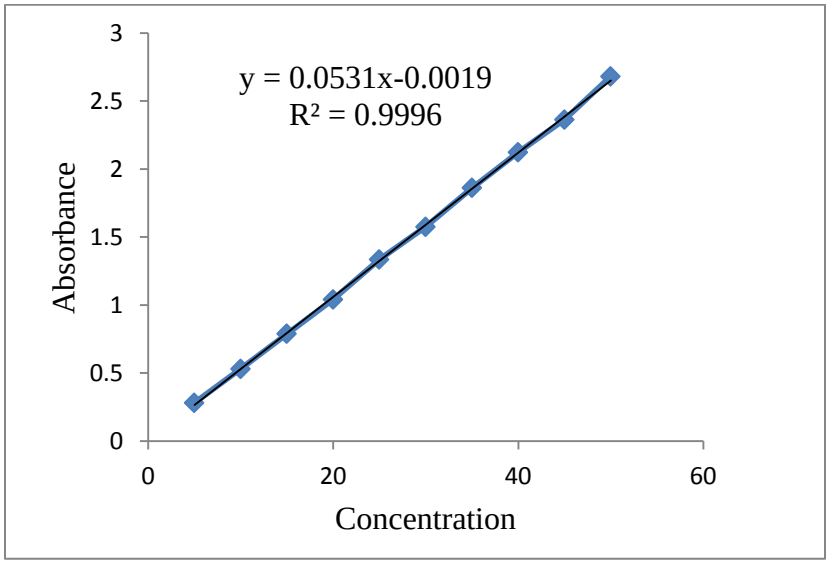

Figure 5: Calibration Graph of Cefixime Trihydrate at 288nm

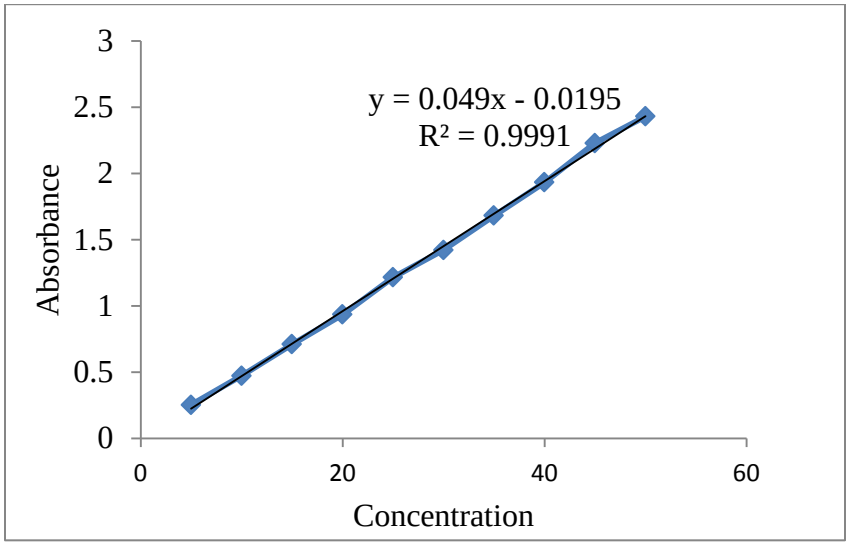

Figure 6: Calibration Graph of Ornidazole at 311nm

CONCLUSION

The evaluation of obtained values suggests that the proposed UV Spectrophotometry methods provide simple, precise, rapid and quantitative analytical method for determination of CEF and ORD in tablet dosage form. After validating proposed method as per ICH guidelines and Correlating the obtained values with the standard values, satisfactory results were obtained. The sample recoveries in all Formulations were in good agreement with their respective Label claims and they suggested no interference of formulation excipients in the estimation. Hence, the method can be easily and conveniently adopted for routine estimation CEF and ORD in tablet dosage form.

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REFERENCES

1. www.wikipedia.org/wiki/Cefixime.
2. www.wikipedia.org/wiki/Ornidazole.
3. Patel DP, Goswami K, Patel M. Development and validation of UV spectrophotometric Method for simultaneous estimation of Cefixime and Linezolid in Combined dosage form. Int J Pharma Res Scholars 2012; V-1, I-4.
4. Ramesh J, Arul Prakasam K.C, Suresh A, Venkatesh Kothapalli, Abdul ShafiSheik. Development and validation of simultaneous equation method for the estimation of cefixime and ofloxacin in pure and in tablet formulation 2011; 2(8): 109-111.

5. Nanda RK, Gaikwad J and Prakash A. Simultaneous spectrophotometric estimation of cefixime and ornidazolein tablet dosage. Int J Pharmtech Res 2009; 1(3):488-491.
6. S Pekamwar, TM Kalyankar, BV Tambe, SJ Wadher. Validated UV-Visible Spectrophotometric method for simultaneous estimation of Cefixime and Moxifloxacin in Pharmaceutical Dosage Form. J Applied Pharm Sci 2015; 5 (01).
7. Bhalodiya HH, Kanasagara N Maru M,Bagada HL Method development and validation for the estimation of Ornidazole in dosage form by Differential UV-Spectrophotometry Method. Int J Pharma Res Scholars 2013; 2; 434-37.
8. Natraj KS, Suvarna Y, Prasanthi G, Saikumar SV. UV-Spectrophotometric validation of simultaneous estimation of ciprofloxacin and Ornidazole in tablet dosage form. Int Res J Pharm 2013; 4:178-81.
9. Sarode MR, Chaple DR, Nikhade PA, Yeole MP. Development and validation of RP-HPLC method for simultaneous estimation of Cefixime and Ornidazole in tablet dosage form. Int J Universal Pharm Life Sci 2012 2(4).