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Spectrophotometric estimation of ofloxacin in bulk drug and pharmaceutical dosage forms

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ABSTRACT

Two simple, precise and economical spectrophotometric methods have been developed for the estimation of Ofloxacin in bulk and pharmaceutical formulations. Ofloxacin shows a sharp peak at 302.0 nm in first order derivative spectrum with $n = 1$ (Method A). Ofloxacin also shows a zero absorbance at wavelength 320.0 nm, which is, based on zero crossing method (Method B). The drug follows Beer-Lambert's law in the concentration range of 2-20 $\mu\text{g/ml}$ in both the methods. Results of the analysis were validated statistically and are found satisfactory. © 2009 Trade Science Inc. - INDIA

KEYWORDS

Ofloxacin;
UV spectrophotometry;
Derivative spectroscopy;
Zero crossing method.

1. INTRODUCTION

Ofloxacin is an fluoroquinolone antibacterial agent. Chemically Ofloxacin 9-fluoro 3methyl-10(4-methyl piperazin-1-yl)-7-oxo 2,3 dihydro 7-h pyrido [1,2,3-de]1,4-benzoxazine 6-carboxylic acid. (Figure 1) It is clinically useful in the treatment of bacterial infection. It is official in Indian pharmacopoeia^[1]. It is listed in The Merck Index^[2] and Martindale, The complete drug reference^[3]. Literature survey reveals that only some UV spectrophotometric methods^[4,5], RP-

HPLC^[6,7], HPLC^[8] methods are reported for the determination of ofloxacin. Hence the objective of the work is to develop new spectrophotometric methods for its estimation in bulk and formulations with good accuracy, simplicity, precision and economy.

2. EXPERIMENTAL

2.1. Materials

Pure sample of ofloxacin was obtained from Microlab, Bangalore as a gift sample. 0.1M HCL prepared in distilled water used as solvent. Jasco V-630 UV/VIS spectrophotometer was used with 1 cm matched quartz cells. Tablets of 200 mg strength were from local pharmacy.

2.2. Methods

Method A - Derivative spectroscopy

Accurately about 100mg of the pure drug was

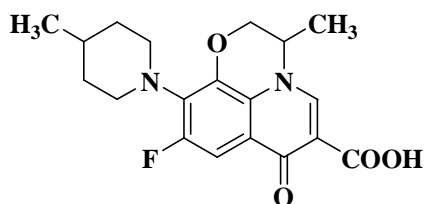


Figure 1

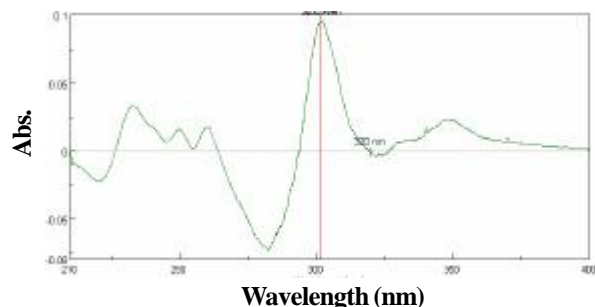


Figure 2: First derivative spectrum of ofloxacin

TABLE 1 : Optical characteristics and other parameters

Parameters	Method A	Method B
λ max (nm)/wavelength range (nm)	302.0	320.0
Beer-Lambert's range $\mu\text{g/ml}$	2-20	2-20
Coefficient of correlation (r)	0.9946	0.9985
a. Slope (m)	0.0346	0.0436
b. Intercept (c)	0.053	0.0123

TABLE 2 : Estimation of ofloxacin in tablet formulation

Method	Tablet	Label claim(mg)	Amount found(mg)	% *Recovery	S.D	S.E
A	T1	200	201.1	100.505	0.9001	0.4025
B	T1	200	199.02	99.57	0.4873	0.2179

*Average of three experiments(n=3)

TABLE 3 : Recovery studies

Excess drug	*Recovery	%RSD
80	100.50	0.2003
100	99.57	0.2096
120	99.02	0.7873

*Recovery is mean of three estimations(n=3)

weighed and dissolved in sufficient quantity of 0.1 M HCL and volume made up to 100ml with 0.1 M HCL to give standard stock solution (1 mg/ml). Aliquots of standard stock solution were pipetted out and suitably diluted with 0.1 M HCL to get final concentration of 2-20 $\mu\text{g/ml}$ of standard solution. The solution were scanned in the spectrum mode from 400 nm to 200 nm wavelength range and the first order derivative spectra were obtained at $n=1$ (Method A) a sharp peak was obtained at 302.0nm (Figure 1). The absorbance difference at $n=1$ ($dA/d\lambda$) was calculated by the inbuilt software of the instrument which is directly proportional to the concentration of the standard solution. A calibration curve was plotted taking the absorbance difference ($dA/d\lambda$) against the concentration of the standard solutions (Figure 2).

Method B : Zero crossing method

It is based on measurement of absorbance of

ofloxacin at 320.0nm at which the drug shows the zero absorbance and the linearity in the range of 2-20 $\mu\text{g/ml}$. Both methods were applied for the sample solution of known concentration and was found to be satisfactory for analysis of tablet formulation (TABLE 1).

2.3. Analysis of pharmaceutical dosage forms

To determine the content of Ofloxacin tablets (label claim: 200 mg of Ofloxacin, tablet) twenty tablets were weighed, their average weight determined and were finely powdered. The weight equivalent to 50 mg of Ofloxacin was taken and amount of powder was dissolved in 0.1 M HCL by stirring for 30 min. The excipients were separated by filtration. After filtration, an appropriate amount of internal standard was added and diluted up to mark with 0.1 M HCL. Appropriate aliquots were subjected to above methods and the amount of Ofloxacin were determined. The results are reported in TABLE 2.

2.4. Recovery studies

To check the accuracy of the developed methods and to study the interference of formulation additives, analytical recovery experiments were carried out by standard addition method, at 80, 100 and 120 % level. From the total amount of drug found, the percentage recovery was calculated. The results are reported in TABLE 3.

RESULTS AND DISCUSSION

Both methods A and B for estimation of ofloxacin in tablet dosage form were found to be simple, accurate and reproducible. Beer-Lambert's law obeyed in the concentration range of 2-20 $\mu\text{g/ml}$ in both the methods. The values of standard deviation were satisfactory and recovery studies were close to 100 %. As the drug ofloxacin showed a broad spectrum, the derivative spectroscopy method applied has the advantage that it locates the hidden peaks in the normal spectrum when the spectrum is not sharp and it also eliminates the interference caused by the excipients and the degradation product present, if any, in the formulation. Hence these methods can be useful in the routine analysis of Ofloxacin in bulk drugs and formulations.

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