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A SELECTIVE UV SPECTROPHOTOMETRIC ANALYTICAL METHOD TO QUANTIFY THE LEVOFLOXACIN IN BULK SAMPLE.

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ABSTRACT

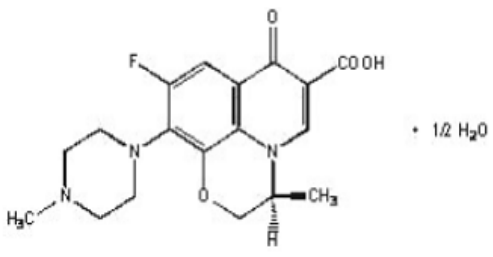
Levofloxacin is a broad spectrum antibacterial agent and belongs to floroquinolones group. The analytical method developed for the quantification of levofloxacin in bulk sample showed absorbance maximum (λ_{max}) of 291.2 nm in distilled water between 200 nm and 400 nm. Linearity study between 2.00 µg/ml to 10.00 µg /ml was found to be linear with regression equation of Y = 0.074*X +C; (r^2 = 0.9999). The accuracy, precision studies showed that the recovery of drug from bulk sample and dosage form are highly accurate and precise with minimum error. The above analytical parameters indicated that the developed UV Spectrophotometric method for Levofloxacin was simple, accurate, precise and reproducible.

KEYWORDS: Levofloxacin, Precession, linearity, regression equation, Absorbance maximum.

INTRODUCTION

Levofloxacin is a synthetic broad-spectrum antibacterial agent for oral and intravenous administration. Chemically, levofloxacin, a chiral fluorinated carboxyquinolone, is the pure (S)-enantiomer of the racemic drug substance ofloxacin. The chemical name is (-)-(S)-9-fluoro2,3-dihydro-3-methyl-10-(4-methyl-1-piperazinyl)-7-oxo-7H-pyrido[1,2,3-de]-1,4-benzoxazine 6-carboxylic acid hemihydrate.[1] The Chemical Structure of levofloxacin is in figure 1.

Review of literature was studied on analytical method to estimate the levofloxacin in bulk fluids and in different dosage forms like tablet and semisolid preparation. It revealed only few spectrophotometric and high performance liquid chromatographic method for the analysis of levofloxacin.[2-5] Hence the present investigation aimed to develop simple UV Spectrophotometric method for the quantitation of levofloxacin in bulk sample.



MATERIALS AND METHODS

Preparation of stock solution

Stock solution of levofloxacin (100 µg/ml) is prepared by dissolving exactly weighed 100mg of drug in 100ml distilled water and from this 1ml is pipetted out and diluted to 10 ml to get 100µg/ml. The obtained solution was scanned for wavelength in UV-Visible spectrophotometer in the range of 200 to 400 nm.

Calibration curve of levofloxacin

The aliquits of 2 – 10 ml of standard stock solutions were transferred into series of 10ml volumetric flask and volume in each flask adjusted with distilled water to get concentration range of 2 – 10 µg/ml. The resulting solutions absorbance was measured at λ_{max} of 291.2 nm against blank distilled water. The calibration curve was constructed by plotting absorbance versus concentration. The developed analytical method was further studied for linearity, accuracy, precession and LOD and LOQ.

Linearity

The linearity of the proposed UV-VIS spectrometer method was determined in terms of correlation coefficient between concentration of the drug and its respective absorbance at different concentrations range. The data were subjected to regression analysis using least square method.

Accuracy

The accuracy study was carried out by adding a known amount of drug from the pre analyzed tablet powder and

percentage recoveries were calculated. The reproducibility of estimation was determined by performing the tablet drug content of different samples. The result shown that best recoveries (98.54-99.13%) were obtained at each added concentration, indicating that the method was accurate.[6]

Precession

Precission of the analytical method is ascertained by carrying out the analysis six times of the same sample. Calculate the % assay, mean assay and % deviation. The developed method was found to be precise as the % deviation values were <0.98% and <0.79%, respectively.[6]

LOD

The limit of detection is the lowest amount of analyte in a sample that can be detected, but not necessarily quantiated under the stated experimental conditions and it is calculated by.[7]

$$LOD = \frac{(\text{Standard deviation})}{\text{Slope}} \times 3.3$$

LOQ

The limit of quantification is the lowest amount of analyte in a sample that can be quantified with the acceptable accuracy and precision under the stated experimental conditions and it is calculated by.[7]

$$LOQ = \frac{\text{Standard deveiation}}{\text{Slope}} \times 10.0$$

RESULTS

Table 1. Statistical calibration data of levofloxacin

Sl.no	Concentration (µg/ml)	Absorbance
1	0.00	0.00
2	2	0.145
3	4	0.282
4	6	0.424
5	8	0.562
6	10	0.705

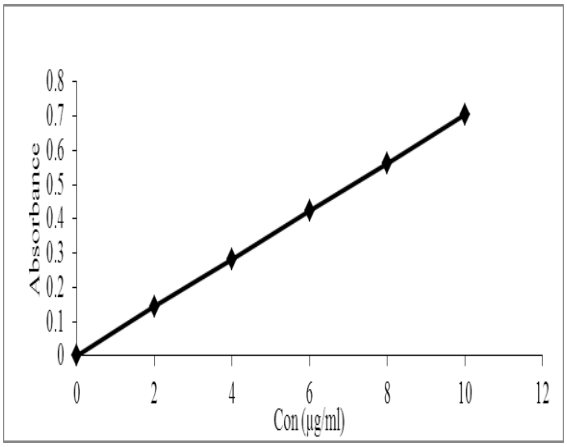


Figure 2. Calibration curve of levofloxacin

Table 2. Linearity study of levofloxacin

Sl.no	Concentration (µg/ml)	Absorbance	Regression data		
1	0.00	0.00	m= slope	C=0	r = 0.9999
2	2	0.145			
3	4	0.282			
4	6	0.424			
5	8	0.562			
6	10	0.705			

M= slope c = intercept r = regression.

Table 3. Accuracy and precision

Drug	Formulation	Amount drug added mg/ml	Amount drug recovered (mg/ml)	Accuracy	Precision
Levoloxacilin	CT1	250.0	248.6	99.44	0.163
	CT2	250.0	249.0	99.6	0.245
	CT3	250.0	245.94	98.6	0.18
	CT4	250.0	243.69	97.35	0.172
	CT5	250.0	245.49	98.19	0.163
	CT6	250.0	244.57	97.82	0.269

DISCUSSION

The U.V. absorption maxima of levofloxacin in distilled water were found to be 291.2nm which is nearly same as literature value 284 nm. Results of the study suggest the value corroborating with previously reported literature values. The slope (m) of calibration curve of levofloxacin was found to be 0.074 and the linear regression equation was Y = 0.074X +C. Linearity studies indicated that estimation of levofloxacin between 2.00 µg / ml to 10.00 µg /ml was found to be linear with a correlation coefficient r^2 = 0.9999. The Accuracy and precision studies of levofloxacin showed that the accuracy of drug recovery rate was 99.6% and 97.35% and the precision was found to be 0.16% to 0.26. The Limit of detection and the limit of quantification calculated by above equation method was found to be 0.089 and 0.27 a. Hence the developed analytical method for levofloxacin by using UV spectrophotometer was found to be accurate and precise to analyze the drug sample.

CONCLUSION

The developed UV spectrophotometric analytical was found to be economic and a simple method in estimation of levofloxacin in bulk sample. Accurate and precise result of estimation of levofloxacin in bulk sample ascertained that the method is suitable in quantification of levofloxacin in solutions and tablet dosages.

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