Simultaneous UV-Spectrophotometric Estimation of Nalidixic acid and Metronidazole from various Multicomponent Formulations

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A simple, rapid, economical and reproducible method has been developed for simultaneous estimation of nalidixic acid and metronidazole from pharmaceutical formulations using multicomponent mode of Jasco V-530 UV/VIS spectrophotometer. Wavelength range between 400 to 220 nm was used for estimation of both drugs. For analysis, six mixed standards were used. The results were confirmed by recovery studies and statistical evaluation. the method requires no mannual calculations.

NALIDIXIC acid is an antibacterial and is official in I.P[1]. and B.P[3]. Metronidazole is a well known antiamoebic and is official in I.P[2]., B.P[4]. and U.S.P[5]. The B.P. describes a potentiometric titration method and I. P. describes a simple spectrophotometric method for the analysis of nalidixic acid, while I.P., B.P. and U.S.P. describe non-aqueous titration method for the analysis of metronidazole. Further literature survey revealed few colorimetric and HPLC methods for the analysis of nalidixic acid and metronidazole individually. Recently difference spectroscopic method[9] and RP-HPLC method have been reported for their simultaneous estimation. Spectrophotometric method was carried out on Jasco V-530 UV/VIS-spectrophotometer with 10 mm matched quartz cuvettes. Acetonitrile (spectrophotometric grade) was used as a solvent. A standard stock solution of the strength 100 mcg/ml was made by dissolving seperately 5 mg of nalidixic acid and metronidazole in 25 ml acetonitrile and diluting with distilled water (from a glass still) to 50 ml in a volumetric flask.

The standard solution was then used in making the mixed standards. The concentrations of both the components in each of the mixed standards are given in Table-1. All mixed standard solutions were scanned in the multicomponent mode over the range of 400 nm to 220 nm. Overlain spectra of nalidixic acid and metronidazole is shown in Figure-1. Overlain spectra of one of the mixed standard samples and synthesized spectra is shown in

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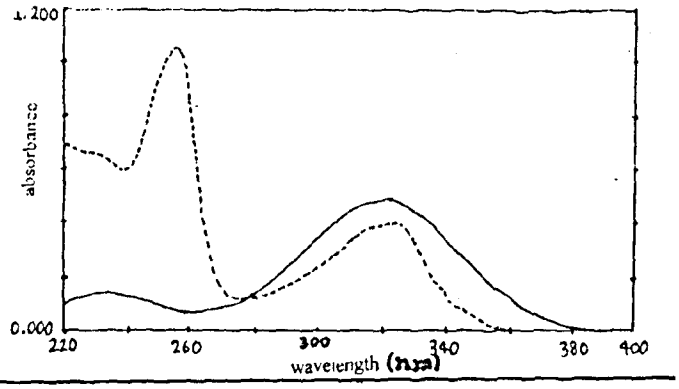
Fig. 1: Overlain spectra of nalidixic acid and metronidazole



----- : spectra of nalidixic acid.
— : spectra of metronidazole

Figure-2. The spectral data from these scans is used to determine the concentrations of nalidixic acid and metronidazole in various tablet formulations. The instrument itself selects wavelengths and utilizes the least square method for the calculation of individual component concentration.

An accurately weighed powder sample equivalent to 10 mg of nalidixic acid was dissolved in 50 ml acetonitrile by intermittent shaking. The volume was then made upto 100 ml using distilled water and the solution was filtered through Whatman filter paper. From the filtrate, dilutions were made to get appropriate concentrations as given in

Table-1 Composition of six mixed standards

Concentration (mcg/ml)	1	2	3	4	5	6
Nalidixic acid	7.5	11.25	0.0	15.0	15.0	18.75
Metronidazole	5.0	7.5	10.0	0.0	10.0	12.5

Table-2: Results of analysis of commercial tablets

Component	Label claim (mg/tab)	Found (mg/tab)	*Mean percent±s.d.	Coefficient of variation(%)	Standard error
Formulation-I					
A	300	302.73	100.73 ± 0.5373	0.5324	0.2409
B	200	196.48	96.68 ± 0.6274	0.6489	0.2606
Formulation-II					
A	300	306.48	102.16 ± 0.7334	0.7179	0.3280
B	200	195.36	97.68 ± 0.6380	0.6531	0.2860

A : nalidixic acid B : metronidazole

* : average of five estimations.

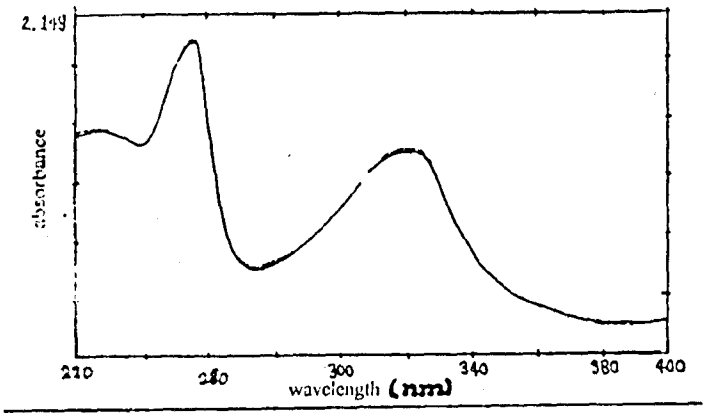
Table -3 Recovery Studies

Concentration of added drug in the final dilution (mcg/ml)		Recovery (mcg/ml)		% Recovery	
A	B	A	B	A	B
7.5	5.0	7.61	5.07	101.46	101.4
7.5	5.0	7.47	5.12	99.60	102.4
7.5	5.0	7.58	5.10	101.06	102.0
7.5	5.0	7.39	5.09	98.53	101.8
7.5	5.0	7.70	5.11	102.66	102.2

A : nalidixic acid B : metronidazole

Table-1. Samples were scanned over the range of 400 nm to 220 nm in the multicomponent mode and the concentrations of each component were obtained by analysis of the spectral data of the sample solution with reference to standards. The results obtained by repeating the estimation procedure five times with two tablet formulations were observed to have good statistical parameters (Table-2).

Fig. 2: Overlain spectra of one of the mixed standard and synthesized spectra



The recovery studies were conducted by addition of different amount of pure drug to preanalysed tablet sample solution and these studies gave satisfactory recovery data as shown in Table-3.

The method developed has been found to be simple, accurate and rapid for routine simultaneous estimation of metronidazole and nalidixic acid in tablet formulation. After several trials, use of six mixed standards has been found to reduce interference among the two components. The value of standard deviation and coefficient of variation are satisfactorily low and recovery was close to 100 % indicating accuracy and reproducibility of the method. This method is specific to Jasco V-530 model. It employs the least square programme for the simultaneous quantitation of components from their mixtures. The method requires no mannual calculations.

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