

SHORT COMMUNICATIONS

Simultaneous Determination of Mefenamic Acid and Paracetamol from Combined Dosage Forms by Spectrophotometry

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A new simple and sensitive spectrophotometric method in the UV region has been developed for the simultaneous determination of mefenamic acid and paracetamol in bulk and in dosage forms. Mefenamic acid shows three absorbance maxima at 219, 284 and 336 nm and paracetamol shows a single absorbance maximum at 257 nm in 0.1N sodium hydroxide. Absorbance corrected for interference was used for estimation. Both these drugs obey Beer's law in the concentration ranges used in this method. The method has been validated statistically and by recovery studies.

Mefenamic acid is an analgesic and antiinflammatory drug. Chemically it is N-(2,3-xylyl) anthranilic acid. Paracetamol is an analgesic and antipyretic drug. Chemically it is 4-hydroxyacetanilide. Both mefenamic acid and paracetamol are official in Indian Pharmacopoeia^{1,2} and British Pharmacopoeia^{3,4}. The I.P. and B.P. suggest a titrimetric assay method for mefenamic acid (bulk drug and capsules) and a UV spectrophotometric^{5,6} assay procedure (tablets) for paracetamol. A survey of the literature revealed that polarographic⁷, HPLC⁸⁻¹¹ and multiwavelength spectroscopy¹² methods are reported for this combination. Simultaneous analysis of paracetamol and mefenamic acid using interference method has been developed in the present investigation.

A Shimadzu UV/visible recording spectrophotometer (Model: UV-160A) was employed with a spectral bandwidth of 3 nm, wavelength accuracy of 0.5 nm with automatic wavelength correction and a pair of 10 nm matched quartz cells. Mefenamic acid, paracetamol and sodium hydroxide were of Analar grade. Tablet formulations of combined dosage forms were procured from market (Meftal-Forte[®], Bluecross Laboratories Ltd.) A number of other products such as Lenagesic[®] (Merind), Mefran, Mefran Forte[®] (Alpin) and Dyesman Forte[®] (Sigma Labs)

have been recently introduced showing the wide application of this combination as analgesic and antiinflammatory¹³.

Stock solutions (100 µg/ml each) of mefenamic acid and paracetamol were prepared using 0.1 N sodium hydroxide solution. In order to obtain a standard curve, dilutions containing 0, 2, 4, 6, 8 and 10 µg/ml of mefenamic acid and paracetamol were prepared. The mixed standards of mefenamic acid and paracetamol were prepared with same concentrations of both the drugs.

The standard solutions of individual drugs and mixed standards were scanned over a range of 200 to 400 nm. Absorbance of the standard solutions and mixed standards of drugs was determined at 257 nm (absorbance maximum of paracetamol) and at 336 nm (one of the absorbance maxima of mefenamic acid) against 0.1 N sodium hydroxide solution as a blank. The absorbance values recorded were used to plot a standard curve.

Twenty tablets were weighed accurately and powdered. Powder equivalent to 50 mg of mefenamic acid and 45 mg of paracetamol was transferred to a 100 ml volumetric flask and dissolved in 60 ml of 0.1N sodium hydroxide solution. It was shaken for 10 min and the volume was finally made upto 100 ml. This solution was filtered, 1 ml of this filtrate was diluted to 100 ml using

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TABLE 1: LINEAR REGRESSION EQUATIONS OF PARACETAMOL AND MEFENAMIC ACID

Standard Curve For	Wavelength (nm)	Linear regression of absorbance (y) on concentration (x)	n	r	s
Mefenamic acid	257	$y = 0.021x + 0.038$	5	1.000	0.002
	336	$y = 0.018x + 0.015$	5	0.997	0.005
Paracetamol	257	$y = 0.075x - 0.011$	5	1.000	0.004
Mefenamic acid in mixed solution	336	$y = 0.018x + 0.015$	5	0.991	0.009
Mefenamic acid + Paracetamol in mixed solution	257	$y = 0.095x + 0.029$	5	1.000	0.005

n, represents the number of samples, r, represents the regression coefficient and s is the standard error.

0.1 N sodium hydroxide solution. Absorbance of this solution at 257 and 336 nm was recorded. The above procedure was performed five times and results were statistically analysed. The amount of the drug in tablets was estimated by analysis of spectral data.

Recovery studies were carried out by the addition of different amounts of pure drug(s) to preanalysed tablet sample solution to give added concentrations of 2, 4, 6, 8 and 10 µg/ml. The given method was found to be accurate, simple and rapid for routine simultaneous estimation of two drugs.

The equations for linear regression for different standard curves have been given in Table 1. The values of correlation coefficient in all the five standard curves lie between 0.99 and 1.00 and the standard error is negligible. The concentration of mefenamic acid in mixed samples was determined from the absorbance of solution at wavelength 336 nm. The absorbance of mefenamic acid at wavelength 257 nm was calculated and from the total absorbance at wavelength 257 nm, the contribution due to mefenamic acid was subtracted. From the contribution to absorbance of paracetamol at wavelength 257 nm,

TABLE 2: ANALYSIS OF TABLET FORMULATION

Tablet Sample	Label Claim (mg/tab)		Found (mg/tab)		% Label Claim	
	MA	PM	MA	PM	MA	PM
1	500	450	490.34	449.30	98.06	99.84
2	500	450	487.40	446.28	97.48	99.17
3	500	450	486.60	445.91	97.32	99.09
4	500	450	491.00	449.28	98.20	99.84
5	500	450	487.90	447.31	97.58	99.40
6	500	450	488.00	448.40	97.60	99.64
Mean			488.54	447.75	97.70	99.50
Standard deviation			0.32	0.3		
Coefficient of variation			0.32	0.3		
Standard error			0.13	0.12		

MA represent mefenamic acid and PM represents paracetamol.

its concentration was determined from its standard curve.

Marketed combination tablets containing 500 mg of mefenamic acid and 450 mg of paracetamol were analysed using the above procedure. The result of the assay has been presented in Table 2. Recovery data is presented in Table 3. The values of standard deviation and coefficient of variation were satisfactory and recovery was close to 100% indicating that this method is accurate and reproducible.

TABLE 3: RESULTS OF RECOVERY STUDIES

Sr.No.	Amount of drug added ($\mu\text{g/ml}$)	% Recovery	
		MA	PM
1.	2	101.6	99.6
2.	4	102.5	98.9
3.	6	99.6	99.9
4.	8	100.0	98.6
5.	10	101.7	100.0

Each result is a mean of three replicates. Wavelengths used were as for assay procedure. MA represents Mefenamic acid and PM represents paracetamol.

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