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Research Article

SIMULTANEOUS SPECTROPHOTOMETRIC ESTIMATION OF PARACETAMOL AND LORNOXICAM IN TABLET DOSAGE FORM

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ABSTRACT

Two new simple, accurate and economic spectrophotometric methods in UV/VIS region have been developed for the determination of paracetamol and lornoxicam in bulk and tablet formulations. Due to mutual interference, quantitation was carried out by the proposed methods namely simultaneous equation (Method 1) and absorbance ratio (Method 2). The wavelengths selected for Method A were 257.10 nm and 288.66 nm i.e. the respective λmax of both the drugs. In Method B two wavelengths 257.10nm, λ_{max} of paracetamol and 284.36 nm, the isobestic point were selected. Both the methods were validated for linearity, accuracy and precision.

Keywords: Paracetamol, Lornoxicam, Ultraviolet Spectroscopy, Simultaneous equation method, Q- Analysis.

INTRODUCTION

Paracetamol and lornoxicam are available in tablet dosage form. Chemically, Paracetamol (PAR) is N acetyl-p-aminophenol. It has antipyretic and analgesic activity. Lornoxicam (LOR) is (3*E*)-6-chloro-3-[hydroxy(pyridine-2-ylamino)methylene]-2-methyl-2,3-dihydro-4*H*-thieno[2,3-*e*][1,2]thiazin-4-one-1,1-dioxide. It has non steriodial anti-inflammatory activity. Paracetamol is official in I.P[1], B.P[2] and USP[3] while lornoxicam is not official in any Pharmacopoeia, but listed in the Merck Index[4]. Literature survey reveals many analytical methods for determination of paracetamol such as UV Spectrophotometry[5], HPLC[6-11], and Capillary electrophoresis[12] methods from pharmaceutical preparations. Few analytical methods for determination of lornoxicam using UV Spectroscopy[13], HPLC[14,15] and polarography[16] in plasma and pharmaceutical formulation have been reported. However, there are no reported methods for simultaneous estimation of both drugs in combination. This paper presents two simple, rapid, reproducible and economical methods for the simultaneous analysis estimation of both the drugs from pharmaceutical dosage form.

MATERIALS AND METHODS

Instrument

A Perkin Elmer - Lambda 25 UV-VIS Spectrophotometer, with matched quartz cell corresponding to 1cm path length and spectral bandwidth 1nm.

Materials

Standard gift samples of paracetamol and lornoxicam were procured from Burgeon Pharmaceuticals, Chennai. Tablets containing both paracetamol and lornoxicam were purchased from local market.

Stock solutions

The stock solution (100mcg/ml) of paracetamol and lornoxicam were prepared separately by dissolving accurately about 10mg of drug in 10ml 0.1N NaOH and the volume was made up to 100 ml with 0.1N NaOH.

Preparation of calibration curves

Solutions of 10mcg/ml of PAR and LAR were prepared separately. Both the solutions were scanned in the spectrum mode from 200.0nm to 400.0nm. The maximum absorbance of PAR and LAR was observed at 257.10nm and 288.66nm, respectively. PAR and LAR showed linearity in the concentration range of 2-10 mcg/ml at their respective maxima. The coefficient of correlation was found to be 0.9991for PAR and 0.9994 for LAR.

Method 1: Simultaneous equation method

Paracetamol and lornoxicam were dissolved separately in sodium hydroxide to get 1000 mcg/mL concentration of each drug. These solutions were then diluted suitable in distilled water to get the concentration of 10 mcg/mL and the solutions were scanned in the wavelength range of 200–400 nm (Fig 1).

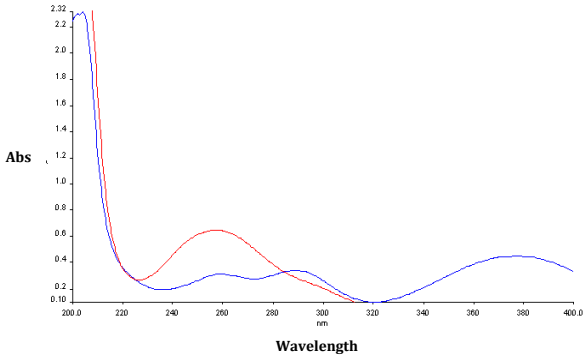

Fig. 1: Overlain spectra of paracetamol and lornoxicam

From the overlain spectrum of PAR and LOR, two wavelengths namely 257.10 nm and 288.66nm, λ_{max} of Paracetamol and Lornoxicam respectively were selected. The calibration curves were constructed in the concentration range of 2-10 µg/ml at each

wavelength i.e. 257.10 nm and 288.66 nm. The absorptivity coefficients were determined for both the drugs at the selected wavelengths and following equations were made.

$$A_1 = 0.0656\ C_x + 0.0316\ C_y \quad .....(1)$$

$$A_2 = 0.0295\ C_x + 0.0344\ C_y \quad .... (2),$$

where A_1 and A_2 are absorbance of sample at 257.10 nm and 288.66 nm, respectively.

0.0656 and 0.0295 are absorptivities of paracetamol at 257.10 nm and 288.66 nm respectively.

0.0316 and 0.0344 are absorptivities of lornoxicam at 257.10 nm and 288.66 nm respectively.

C_x and C_y are concentrations of paracetamol and lornoxicam respectively.

Method 2: Absorption Ratio / Q Analysis Method

From the overlain spectrum of paracetamol and lornoxicam (Fig 1), two wavelengths were selected, one at 257.10 nm the λ_{max} of Paracetamol and other at 284.36 nm, an iso-absorptive point for both the drugs. The solutions were prepared in the similar manner as mentioned in the previous method. The absorbance values were measured at selected wavelengths. The concentration of each component was calculated by mathematical treatment of the following mentioned equations.

For Paracetamol,

$$C_X = \frac{Q_0 - Q_2}{Q_1 - Q_2} \times \frac{A}{a_1}$$

For Lornoxicam,

$$C_Y = \frac{Q_0 - Q_1}{Q_2 - Q_1} \times \frac{A}{a_2}$$

Where, C_x and C_y are concentrations of PAR and LOR respectively.

A_1 is the absorbance of sample at isoabsorptive wavelength 284.36nm.

a_1 and a_2 are absorptivity of PAR and LOR at isoabsorptive wavelength 284.36 nm.

Q1 = Absorbance of PAR at 257.10 nm/ Absorbance of PAR at 284.36 nm

Q2 = Absorbance of LOR at 257.10 nm/ Absorbance of LOR at 284.36 nm

Q0 = Absorbance of sample solution at 257.10 nm/ Absorbance of sample solution at 284.36 nm

Analysis of tablet formulation

Twenty tablets were weighed and crushed to fine power. The amount of powder equivalent to 500mg of PAR and 8 mg of LOR was weighed and transferred to 100ml volumetric flask. The drug content was shaken with 25ml of 0.1N NaOH and was kept in ultra sonicator for 20 min. Finally, the volume was made up to the mark with distilled water. The solution was filtered through Whatman filter No.41. The filtrate was further diluted to obtain sample solutions of concentrations within Beer-Lambert's range. The absorbance of sample solutions were measured at selected wavelengths for the estimation of PAR and LOR. The values were replaced in the above mentioned equations and the concentration of each drug was calculated by both the methods. Recovery studies were carried out at 80%, 100% and 120% level of label claim. The proposed methods were validated statistically and the results are represented in Table1.

Table 1: Assay of tablets

Method	Tablet	Label claim (mg/tablet)		% Label claim found		Standard deviation		% Recovery	
		PAR	LOR	PA R	LOR	PAR	LOR	PAR	LOR
I	T1	500	8	98.9	101.1	0.05	0.04	98.7	102
	T2	500	8	102.4	103	0.03	0.02	100.8	101
II	T1	500	8	99	101	0.02	0.03	98.9	101.9
	T2	500	8	100	103	0.04	0.05	97.8	102.1

T1 – Lorsumo Forte, Alkem Laboratories Ltd, Mumbai, T2 – LRn-8-P, Glenmark Pharmaceutical Ltd, Himachal Pradesh

RESULTS AND DISCUSSION

The proposed methods are simple, accurate, cost effective and rapid. The statistical analysis of the methods proves that they are reproducible and efficient for the simultaneous analysis of both the drugs in pharmaceutical dosage form without any prior separation. These methods are convenient and free from interferences of excipients and hence can be employed for routine quality control analysis.

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