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SIMULTANEOUS DETERMINATION OF TELMISARTAN AND AMLODIPINE BESYLATE IN TABLET DOSAGE FORM BY SPECTROPHOTOMETRY

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ABSTRACT

Two new simple, accurate and precise spectrophotometric methods have been developed for simultaneous determination of telmisartan and amlodipine in pharmaceutical dosage form. The methods employed were absorbance correction method (Method A) and dual wavelength method (Method B). The method A employs wavelength 350.4 nm for direct estimation of amlodipine where telmisartan shows nil absorbance. Estimation of telmisartan is carried out after correction for absorbance of telmisartan at 239 nm. In method B, amlodipine was determined by plotting the difference in absorbance at 247.4 and 299 nm (difference is zero for telmisartan) against the concentration of amlodipine. Similarly, for the determination of telmisartan, the difference in absorbance at 226 and 248 nm (difference is zero for amlodipine) was plotted against the concentration of telmisartan. Both the drugs obey the Beer's law in the range 5-50µg/mL for amlodipine at 239 nm and 5-40 µg/mL at 350.4 nm and 5-35 µg/mL for telmisartan at 239 for Method A, and 5-50 µg/mL for amlodipine and 5-30 µg/mL for telmisartan for Method B. The results of analysis have been validated statistically and by recovery studies.

Key words: Telmisartan (TEL), Amlodipine (AML), Absorbance correction method, Dual wavelength method.

INTRODUCTION

Telmisartan (TEL) is 4-[1,4–dimethyl-2-propyl-(2,6-bi-1H-benzimidazole]-1-yl) methyl] [1,1-biphenyl]-2-carboxylic acid[1]. Telmisartan is a new angiotensin II receptor antagonist for the treatment of essential hypertension usually given in combination with amlodipine. Amlodipine besylate (AML) is 3-ethyl-5-methyl (4R-S)-2-[(2-aminoethoxy)-methyl]-4-(2-chlorophenyl)-6-methyl-1,4-dihydropyridine-3-5-dicarboxylate

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benzenesulphonate[2] and is used as calcium antagonist. The literature survey of these two drugs revealed that some spectrophotometric, RP-HPLC, HPTLC methods have been developed for estimation of individual drugs and in combination with other drugs and in plasma[3-17]. No method has been developed for the simultaneous estimation of telmisartan and amlodipine in formulations.

EXPERIMENTAL

Instrumentation

All spectral measurements were made on Shimadzu UV-VIS spectrophotometer – 1650 with 1 cm matched quartz cells.

Preparation of standard stock solution

An accurately weighed quantity of 25 mg of TEL and AML were separately taken in a 50 mL volumetric flask, dissolved in ethanol and made up to volume using ethanol to get 500 μg/mL, respectively.

Preparation of sample solution

The average weight of 20 tablets was determined and finely powdered. The powder equivalent to 40 mg of TEL was taken in 50 mL volumetric flask and dissolved in 25 mL of ethanol, shaken well for 15 minutes and then made up to volume with ethanol. The solution was then filtered through Whatman filter paper No. 41. The first few mL of the filtrate was discarded and remaining solution was used for further analysis.

Assay procedure

Method A : Absorbance correction method[18]

In this method, two wavelengths in the zero order spectra were selected such that one of the drugs shows practically nil absorbance at the detection wavelength of the other drug, while other wavelength selected where both the drugs have considerable absorbance. At detection wavelength 350.4 nm (λ_1), TEL has practically nil absorbance (Fig. 3) so it is used for direct determination of AML. The other wavelength selected was 239 nm (λ_2), (Fig. 3) where TEL was estimated after correction for absorbance of AML at this wavelength. The equations obtained for the determination of concentration of drugs in marketed sample by substituting the absorbance and absorptivity values obtained at 350.4 nm for AML and 239 nm for both AML and TEL are as follows.

$$C_{AML} = A_{350.4} / 113.34 \quad \ldots(1)$$

$$C_{TML} = A_{239} - (355.1 \times C_{AML}) / 652.3 \quad \ldots(2)$$

The results of analysis of tablet formulation are reported in Table 2.

Table 1: Optical characterestics and validation of proposed methods

Parameters	Method A		Method B	
	AML	TEL	AML	TEL
Wave lengths selected	350.4 nm	239 nm	247.4 & 299 nm	226 & 248 nm
Beer's law limit (µg/mL)	5-50	5-40	5-50	5-40
Linearity range (µg/mL)	5-40	5-35	5-50	5-30
Slope	0.0105767	0.072105	0.02588	0.032735
Intercept	-0.0016444	-0.00083	0.0008181	0.032821
Regression Equation (y = m x + c)	0.01057 x - 0.001644	0.072105 x - 0.00083	0.02588 x + 0.0008181	0.032735 x + 0.032821
Corelation coefficient	0.9997	0.9997	0.9999	0.9986
% RSD	0.2487	0.2012	0.7169	0.2751
LOD	1.08567	0.00545	0.2190	7.1687
LOQ	3.2899	0.01651	0.66374	21.7234

Method B : Dual wavelength method[19]

In this method, difference in absorbance at two selected wavelengths was calculated. The difference in absorbance at 247.4 and 299 nm was found to be zero for TEL. Hence, these two wavelengths were selected for the determination of AML. Similarly, 226 and 248 nm were selected for the determination of TEL, where the difference in absorbance was found to be zero for AML. Zero order spectra was recorded for solutions at different concentration of TEL and AML between 200-400 nm. The difference in absorbances at 247.4 and 299 nm were plotted against the concentration of AML and that at 226 and 248 nm was plotted against the concentration of TEL. The amount of AML and TEL in marketed

sample was computed from the calibration curve. The results of analysis of tablet formulation are reported in Table 2.

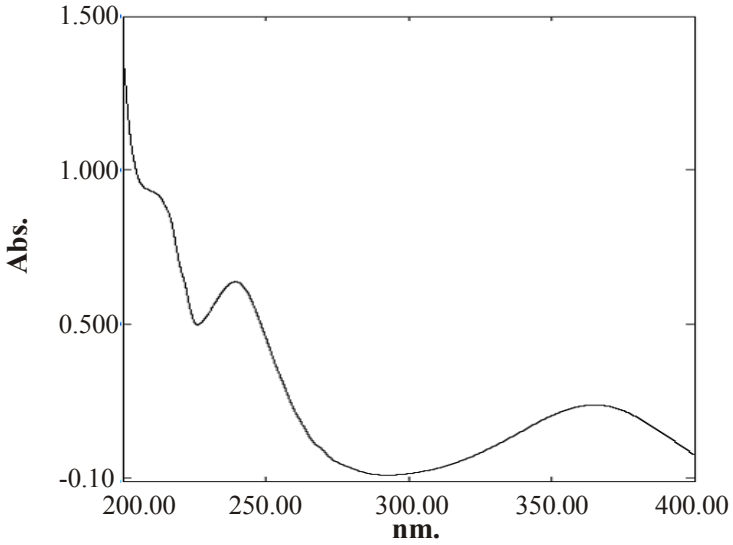

Fig. 1: Absorption maximum of AML

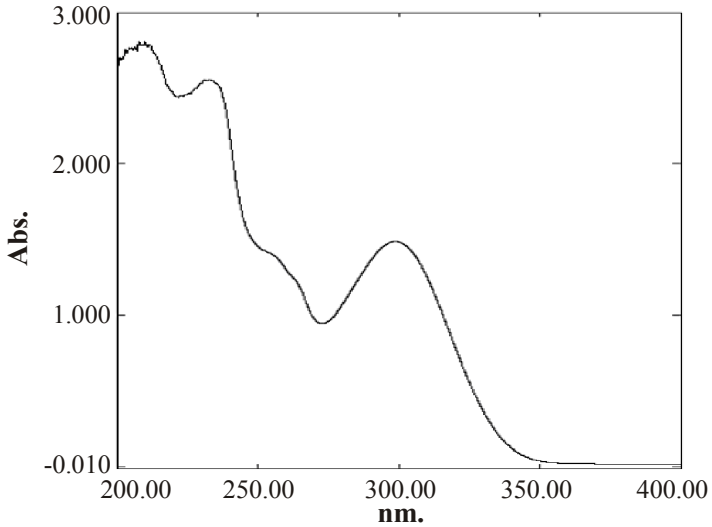

Fig. 1: Absorption maximum of TEL

Recovery studies

To ensure the accuracy and reproducibility of the results obtained, recovery experiments were performed by adding known amounts of pure drug to the previously

analyzed formulation samples and these samples were reanalyzed by the proposed method. The percentage recoveries thus obtained are given in the Table 2.

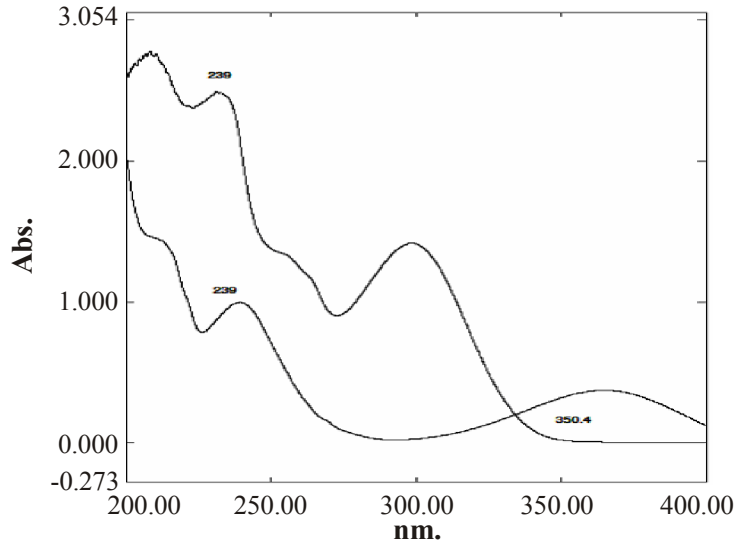

Fig. 3: Overlain spectrum of AML and TEL

Table 2: Results of tablet formulation and recovery studies

Method	Drug	Label claim (mg/tablet)	Amount obtained (mg)*	% Lable claim	**% Recovery by the proposed methods*
Method A	AML	5.0	5.2048	104.09	99.96
	TEL	40.0	40.7375	101.82	99.75
Method B	AML	5.0	4.9166	98.33	102.8
	TEL	40.0	40.8633	102.15	99.8

*Average of three determinations, AML-Amlodipine, TML-Telmisartan
**After spiking the sample

RESULTS AND DISCUSSION

The optical characteristics such as RSD, regression equation, correlation coefficient, slope and intercept for the two methods were calculated and the results are summarized in

Table 1. The amount and % label claim obtained by the proposed methods are presented in Table 2. Interference studies revealed that the excipients and additives did not interfere. Hence, these methods are most economic, simple, sensitive and accurate and can be used for the simultaneous determination of AML and TEL in pharmaceutical preparations.

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