

Simultaneous Estimation for Rosuvastatin calcium and Aspirin from Capsule Dosage Forms by First Order Derivative Spectroscopic Method

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Abstract: Rosuvastatin calcium and aspirin are used in combination for treatment of hypertension. The present work deals with simple first order derivative spectrophotometric method development for simultaneous estimation of rosuvastatin calcium and aspirin in two component capsule formulation. For determination of sampling wavelength each drug in the concentration of 10 µg/ml were used, absorption wavelength were found to be at 259 nm for rosuvastatin calcium and 238 nm for aspirin. Linearity observed in 0.5-2 µg/ml for rosuvastatin calcium and 3.75-15 µg/ml for aspirin. The method was found to be accurate and precise.

Key-words: Rosuvastatin calcium, aspirin, derivative spectroscopy.

INTRODUCTION AND EXPERIMENTAL

Rosuvastatin calcium is chemically bis [(E)-7 [4-(4-fluorophenyl)-6 isopropyl-2-[methyl (methyl sulphonyl) amino] pyrimidin-5-yl] (3R,5S) -3,5-dihydroxyhept-6-enoic acid] Calcium salt.^{1,2} It is a lipid lowering drug. It inhibits the enzyme 3-hydroxy-3-methyl glutaryl coenzyme A (HMG-CoA) reductase, the rate limiting enzyme that converts HMG-CoA to mevalonate; a precursor of cholesterol and thereby checks the synthesis of cholesterol. It is used in the treatment of hypercholesterolemia and dyslipidemia. The typical dose of rosuvastatin calcium is 5-40 mg per day and it reduces 40-70% LDL level³.

A survey of literature showed few UVspectrophotometric⁴⁻⁹, few HPLC¹⁰⁻¹⁴, few HPTLC¹⁵⁻¹⁶ two chromatography stability indicating method¹⁷, few LC-MS method¹⁸⁻²⁰ and few solid phase extraction using tandem mass spectroscopy

methods²¹ are available for the estimation of rosuvastatin in pharmaceutical preparation and in biological fluids.

Aspirin is chemically 2-acetyloxybenzoic acid, or acetylsalicylic acid. Aspirin is used as analgesic, antipyretic and antiinflammatory drug. Salicylate, the main metabolite of aspirin, is an integral part of human and animal metabolism. While much of it is attributable to diet, a substantial part is synthesized endogenously. Aspirin also has an antiplatelet effect by inhibiting the production of thromboxane, which under normal circumstances binds platelet molecules together to create a patch over damaged walls of blood vessels. Because the platelet patch can become too large and also block blood flow, locally and downstream, aspirin is also used long-term, at low doses, to help prevent heart attacks, strokes, and blood clot formation in people at high risk of developing blood clots.²¹

A survey of literature showed few UV spectrophotometric²²⁻²³, few HPLC²⁴⁻²⁵, and few HPTLC²⁶ are available for the estimation of aspirin in pharmaceutical preparation and in biological fluids.

MATERIALS AND METHODS

INSTRUMENT

Spectrophotometric analysis was carried out on a UV – Visible double beam spectrophotometer (JASCO), model V-530 with 10 mm matched quartz cells was used for experiments. The instrument settings were zero order and first derivative mode and band width of 2.0 nm in the range of 200–400 nm.

REAGENTS AND CHEMICALS:

Rosuvastatin calcium supplied by Cipla Ltd. India . Aspirin (analytical grade) supplied by Bhagyashree chemicals, Islampur. All solvents were spectrophotometric grade obtained from LOBA

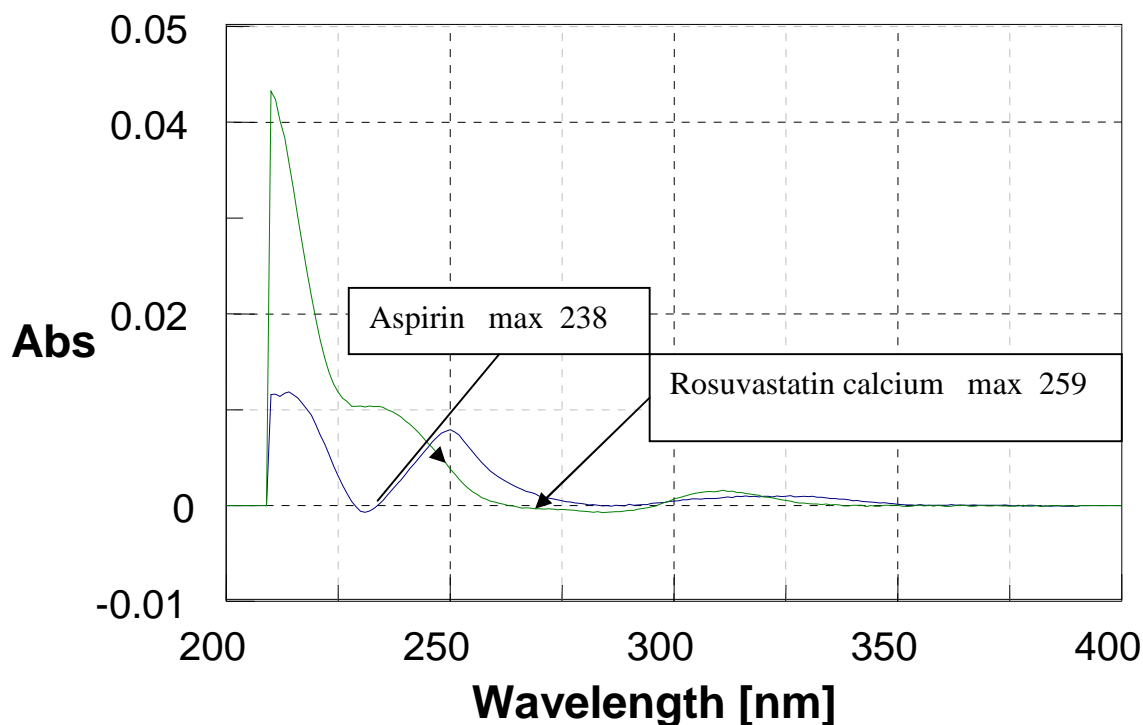
chemicals. Water was purified by glass distillation apparatus. Capsule of rosuvastatin calcium and aspirin were purchased from local market for analysis.

METHOD

PREPARATION OF STANDARD DRUG SOLUTION

Standard stock solution of rosuvastatin calcium and aspirin was prepared by dissolving 10 mg of drug up to 100 ml of methanol : water (1:1) separately to get stock solution containing 100 µg/ml of rosuvastatin calcium and aspirin respectively. All the solutions were protected from light. The first derivative spectra were obtained by instrumental electronic differentiation in the range of 200 to 400 nm. A signal at D_{259} of first derivative spectrum was selected for quantification of rosuvastatin calcium, while a signal at D_{238} was selected for quantification of aspirin. (Figure: 1)

Figure 1 Overlain spectra of rosuvastatin calcium and aspirin in first order derivative mode.



Standard stock solutions of rosuvastatin calcium and aspirin were prepared by dissolving 10 mg of rosuvastatin and 10 mg of aspirin bulk drug in 100 ml of methanol water(1:1) to get a concentration of 100 µg/ml for rosuvastatin calcium and 100 µg/ml for aspirin separately. Further dilutions were made from these solutions in same solvent to get linearity concentrations 0.5-2 µg/ml for rosuvastatin calcium and 3.75-15 µg/ml aspirin. All the solutions were protected from light and were analyzed on the same day of preparations.

PROCEDURE FOR PLOTTING CALIBRATION CURVE

From standard drug solutions five working standard solutions containing rosuvastatin calcium and aspirin with concentration of 0.5, 1.0, 1.5, 2.0 µg/ml of rosuvastatin calcium and 3.75, 7.5, 11.25, 15 µg/ml of aspirin were prepared. The absorbance of above solutions were measured at the selected wavelengths and the calibration curves were constructed by plotting the absorbance against the concentration for both the drugs. Calibration curve for rosuvastatin

calcium was plotted by recording absorbance at , 243 nm for absorption spectra & 259 nm for first derivative. Similarly calibration curve for aspirin was plotted by recording absorbance at, 226 nm for absorption spectra & 238 nm for first derivative. Both the drugs obeyed Beer's law in the concentration range of 0.5-2.5 µg/ml for rosuvastatin calcium , 3.75-15 µg/ml for aspirin.

ANALYSIS OF MARKETED FORMULATION

Marketed capsule formulation (Unistar) containing 10 mg of rosuvastatin calcium and 75 mg of aspirin was used for preparation of sample solution. Twenty capsules were weighed accurately, finely powdered and powder equivalent to 10 mg of rosuvastatin calcium was weighed accurately and dissolved up to 100 ml of methanol:water (1:1) solution was sonicated for 20 min, allowed to cool and then filter through whatmann filter paper no.41 final volume was made up to the mark with methanol : water (1:1), the resulting solution was used for further dilutions. Result of analysis was shown in table 1.

TABLE: 1 STATISTICAL PARAMETERS FOR ROSUVASTATIN AND ASPIRIN.

Parameters	Rosuvastatin calcium	Aspirin
λ_{max}	243 nm	226nm
Beer's law limit (µg/ml)	0.5-2	3.75-15
Standards deviation	0.000437	0.007124
Regression Equation data:		
Slope	0.000676	0.001471
Intercept	0.000805	-0.000209
Correlation coefficient (r^2)	0.999	0.998
Equation of line $Y = mX + c^*$	$Y = 0.00676X + 0.000$	$Y = 0.001471X - 0.0004$

*Y = absorbance, m = slope, X = concentration in µg/ml, c = intercept

TABLE 2: RESULTS OF ANALYSIS OF COMMERCIAL FORMULATION

Analyte	Label claim (mg/cap)	Amount estimated	% label claim \pm SD*
Rosuvastatin calcium	10mg	9.96752mg	99.6752 \pm 0.2567
Aspirin	75mg	74.334mg	99.112 \pm 0.6815

SD: Standard Deviation., *Denotes average of six determinations

TABLE 3: RESULTS OF PRECISION STUDIES

Analyte	Label claim (mg/cap)	% Label claim estimated (Mean \pm SD*)	RSD*
Rosuvastatin calcium	10mg	98.98 \pm 0.89091	0.900093
Aspirin	75mg	99.224 \pm 0.98167	0.9893

RSD: Relative Standard Deviation, SD: Standard Deviation.

*Denotes average of six determinations.

TABLE NO. 4 RECOVERY STUDIES OF. ROSUVASTATIN AND ASPIRIN

Marketed Formulation (Unistar)	Recovery level (%)	Initial amount (µg/ml)	Amount added (µg/ml)	Total amount added (µg/ml)	Amount found (µg/ml)	Recovery (%)	Mean Recovery (%)	SD
Rosuvastatin	80	1	0.8	1.8	1.8259	101.44	99.352	0.96645
	100	1	1	2	1.9767	98.9393		
	120	1	1.2	2.2	2.1709	98.67786		
Aspirin	80	7.5	6	13.5	13.64	101.10	100.63	0.8266
	100	7.5	7.5	15	14.95251	99.6834		
	120	7.5	9	16.5	16.6815	101.1344		

RESULT AND DISSCUSION

Sampling wavelengths were determined from scanning individual drug samples in 200-400 nm range. Sampling wavelengths were found to be 259 nm and 238 nm for rosuvastatin calcium and aspirin respectively in first order derivative mode. For this method equations generated were $Y = 0.00676X + 0.000$ and $Y = 0.001471X - 0.0004$ for rosuvastatin calcium & aspirin respectively. Limits of detection were found to be 0.002135 and 0.015 µg/ml of rosuvastatin calcium & aspirin respectively. Limits of quantification were found to be 0.00646 and 0.048 µg/ml for rosuvastatin calcium & Aspirin

respectively. Results of capsule analysis were reported in table no. 2&3, result of recovery study reported in table no. 4 respectively.

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