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DEVELOPMENT OF A UV-SPECTROPHOTOMETRIC METHOD FOR THE SIMULTANEOUS DETERMINATION OF ROSUVASTATIN CALCIUM AND ASPIRIN IN TABLETS

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ABSTRACT:

A specific, rapid and simple UV spectrophotometric method with good sensitivity was developed and validated for the simultaneous quantification of Rosuvastatin calcium and aspirin in standard solutions and tablets. The method employed solving of simultaneous equations based on the measurement of absorbance maxima at 243 and 207 nm, for Rosuvastatin calcium and aspirin, respectively. The calibration curve was linear for both drugs in a concentration range of 3--18(µg/ml) and 2-12(µg/ml). It can be concluded from the results that present method for the simultaneous determination of Rosuvastatin calcium and aspirin in tablets is specific, rapid and simple with good sensitivity. This analytical method is also applicable in ordinary laboratories also. It can also be adopted for quality control tests for these drugs in tablets.

Key words: UV spectrophotometric method, Rosuvastatin calcium, aspirin, and simultaneous determination.

INTRODUCTION:

Rosuvastatin calcium is chemically bis [(E)-7 [4-(4-fluorophenyl)-6 isopropyl-2-[methyl (methylsulphonyl)amino] pyrimidin-5-yl] (3R,5S) -3,5-dihydroxyhept-6-enoic acid] Calcium salt.[1-2] It is alipid lowering drug. It inhibits the enzyme 3-hydroxry-3-methyl glutaryl coenzyme A (HMG-CoA) reductase,the rate limiting enzyme that converts HMG-CoA tomevalonate;a

precursor of cholesterol and there bychecks the synthesis of cholesterol. It is used inthetreatmentofhypercholesterolemia anddyslipidemia.

The typical dose of rosuvastatin calciumis 5-40 mg per day and it reduces 40-70% LDL level[3]. A survey of literature showed few UVspectrophotometric[4-9], few HPLC[10-14], few HPTLC[15-16] two chromatography stability indicating method[17], fewLC-MS method[18-20] and few solid phase extractionusing tandem mass spectroscopy methods21 areavailable for the estimation of rosuvastatin inpharmaceutical preparation and in biological fluids.

Aspirin is also known as acetylsalicylic acid is a salicylate drug, often used as an analgesic, antipyretic, anti-inflammatory and has an anti-platelet effect by inhibiting the production of thromboxane, which under normal circumstances binds platelet molecule together to create a patch over damage of the walls within blood vessels. Chemically it is 2-acetoxybenzoic acid and is a non-steroidal anti-inflammatory drug (NSAIDs) and shows inhibition of the enzyme cyclooxygenase and it is official in Indian Pharmacopoeia, The United States Pharmacopeia and British Pharmacopoeia[22-25]

2. EXPERIMENTAL WORK:

2.1 Instruments and reagents:

A Shimadzu UV - 1800 UV/VIS spectrophotometerwas used with 1 cm matched quartz cell.

All the chemicals used were of analytical grade.Methanol A.R. grade were procured from Loba Chem.Ltd., Mumbai. An analytically pure sample of Rosuvastatin calcium and aspirin were procured as gift sample from Chandralabs Hyderabad. Tablet formulation was procured from a local pharmacy.

2.2 Preparation of standard stock solution:

Stock solutions of both the drugs were prepared by dissolving accurately weighed 100 mg of each standard drugs in 100 ml methanol. Both stock solution (100 µg/ml) were further diluted to produce solutions of 10 µg/ml Rosuvastatin calcium, 15 µg/ml aspirin and scanned in the entire UVrange (200 - 400 nm) to determine the absorbance maxima .Absorbance maxima of Rosuvastatin calcium and aspirin were detected at 243 nm (λ2) and 207nm (λ1), respectively. Both the spectras were overlained. The calibration curve was linear for both drugs in a concentration range of 3--18(µg/ml) and 2-12(µg/ml).

2.3 Analysis of marketed formulations:

Twenty tablets of formulation were accuratelyweighed and powdered. An amount of powder

equivalent to 10 mgand 15mg of Rosuvastatin calcium and aspirin were weighed and dissolved in 100 ml of methanol. It was filtered through Whatman filter paper No. 41 after subjecting30 minutes for sonicating and then final dilution was made with methanol to get final concentration.

2.4 Simultaneous equations method:

The developed method was based on simultaneousequations method. Absorbance maxima of

Rosuvastatin calcium and aspirin were 243nm (λ2) and 207 nm (λ1), respectively.

The absorptivity coefficients of the two drugs were determined by using Beer's law. The overlain spectra of Rosuvastatin calcium and aspirin are represented in [Figure - 1].

A set of two simultaneous equations was developed using these absorptivity and Coefficients.

Cx =A1 ay2 – A2 a y1 / ax1ay2-ax2ay1

Cy = A1 a x2 – A2 a x1 / a y1ax2 - ay2a x1

A1 and A2 are absorbances of mixture at 207 nm and 243 nm respectively, ax1 and ax2 are absorptivities

of Aspirin at λ 1 and λ 2 respectively and ay1 and ay2 are absorptivities of Rosuvastatin at λ1 and λ 2 respectively. Cx and Cy are concentrations of Aspirin and Rosuvastatin respectively.

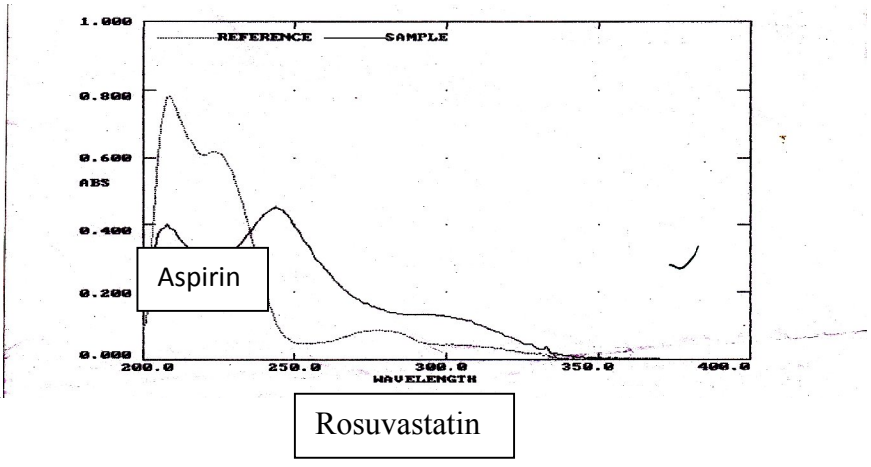

FIGURE-1

Table No-1: Calibration parameters

Sr. No.	Parameter	Rosuvastatin	Aspirin
1	Absorption Maxim(nm)	244(nm)	207(nm)
2	Beer's Law limits(mg/ml)	3--18(µg/ml)	2-12(µg/ml)
3	Regression equation (y)* Slope (b) Intercept (a)	.045 .004	.036 .176
4	Correlation coefficient	0.999	.998
5	Limit of detection (µg / ml)	.0859	0.2319
6	Limit of quantificati(µg /ml)	.2682	0.7239

*y = a ± bx; where x is the concentration in mg/ml and y is absorbance.

Table No- 2: Results of Recovery study:

Rosuvastatin		abs	recovery	Recovery%
80	8+1=9	0.396	8.82	98%
100	10+1=10	0.492	10.96	99.62%
120	12+1=13	0.59	13.14	101.08%

Aspirin		abs	Recovery	Recovery%
80	12+1=13	0.654	13.55	104.22%
100	15+1=16	0.779	16.14	108.87%
120	18+1=19	0.858	17.77	98.6%

* is average of six determinations.

Table No 3: Assay results of Aspirin and Rosuvastatin Calcium in tablet.

ASSAY	ABS	CONC	Labeled (mg)	%DRUG
ASPIRIN	0.724	15mcg	75mg	100%
ROSUVASTATIN	0.093	2mcg	2mg	99%

* is average of six determinations.

RESULTS AND DISCUSSION:

The method was validated according to International Conference on Harmonization guidelines. Linear regression equations (intercepts and slopes) for mixtures of Rosuvastatin calcium and aspirin were established. The high values of the correlation coefficients and the values of *Y*-intercepts close to zero indicate the good linearity of the calibrations. The values of slope, intercept and correlation coefficient values are given in Table 1. Limit of detection and

limit of quantitation were determined by using the formula based on the standard deviation of response and the slope. The limit of detection and limit of quantification were calculated by using the equation LOD = 3.3 x σ / S and LOQ = 10 x σ / S, where σ is the standard deviation of intercept, S is the slope and it is mentioned in Table 1.To study the accuracy of the developed method, and to check the interference of excipients used in the dosageforms, recovery studies were carried out by thestandard addition method and results are shown inTable 2. Assay results of Aspirin and Rosuvastatin Calcium in tablet are shown inTable-3.

4. CONCLUSION:

The developed method was found to be simple, sensitive, accurate and reproducible and can be used for routine quality control analysis of Rosuvastatin calcium and aspirin in bulk and in pharmaceutical formulations.

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