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RP-HPLC Method for the Simultaneous Estimation of Rosiglitazone and Gliclazide in Tablets

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Abstract: A reverse phase HPLC method is described for the determination of rosiglitazone and gliclazide in tablet dosage form. Chromatography was carried on Phenomenix Gemini C_{18} column using in mixture of ammonium phosphate buffer, Acetonitrile and methanol in the ratio 50: 35: 15 v/v as mobile phase at a flow rate 1 mL min^{-1} and the effluent was monitored at 254 nm. The retention time for rosiglitazone was 3.74 and gliclazide 7.84 min. The limit of detection for rosiglitazone was 4.07 µg/mL and gliclazide 1.19 µg/mL. The LOQ obtained for rosiglitazone was 12.33 µg/mL and 3.612 µg/mL. The percentage assay for rosiglitazone was 99.92% and gliclazide was 99.82%. The method was validated for accuracy precision and system suitability. The proposed method was fast accurate and precise so it can be used for regular quality control of the drug.

Keywords: Rosiglitazone, Gliclazide, RP-HPLC, Estimation and tablets

Introduction

Rosiglitazone is used as an antidiabetic drug chemically 5-(4-(2-(methyl (pyridine-2-yl) amino) ethoxy) benzyl) thiazolidine-2, 4-dione. It acts by activation of the intracellular receptor class of the peroxisome activated receptors[1] (PPARS). Gliclazide (Figure 1) is a sulphonyl urea derivative and it acts by increasing the sensitivity of the beta cells of islets of langerhans[2,3]. Gliclazide is official in BP but rosiglitazone is not official in any of the pharmacopoeias. Literature surveys reveal that only a few methods have been reported for these combinations[4-7]. No method so for has been reported for the estimation of rosiglitazone and gliclizide in combined form. The paper aims to develop an isocratic RP- HPLC method[8-12] for the estimation of rosiglitazone and gliclazide in tablet dosage forms.

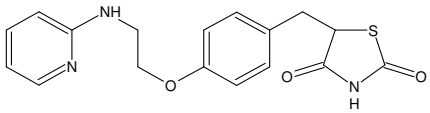

Figure 1. The chemical structure of rosiglitazone and gliclazide.

Experimental

Rosiglitazone and gliclazide were obtained as a gift sample from Micro labs Hosur, India. Acetonitrile HPLC grade, methanol AR grade, phosphate buffer AR grade. All other chemicals used were of AR grade and obtained from Sd Fine Chemicals, Mumbai. Water HPLC grade of Milli-Q were used.

Chromatographic conditions[13-15]

Chromatographic conditions were achieved using a Phenomenix Gemini C-18 (250 x 4.6 mm 5 µ) analytical column. The mobile phase consisting of acetonitrile, phosphate buffer (pH 4.5) and methanol (50:35:15 v/v) was passed through 0.45 µm membrane filter and degassed by ultrasonication. The flow rate was maintained at 1 mL/min and the measurements were made at 254 nm. The column and the HPLC system were kept in ambient temperature.

Preparation of mobile phase

The mobile phase was prepared by mixing phosphate buffer (pH 4.5), acetonitrile and methanol in the ratio 50:35:15 v/v. The solution was then passed through 0.45 µm membrane filter and sonicated.

Preparation of standard stock solution

Standard solution of the pure drug was prepared by dissolving 53.3 mg rosiglitazone RS and 1601.2 mg gliclazide RS in 100 mL volumetric flask. The drugs were dissolved with methanol and volume made up to the mark with same solvent. Appropriate volumes of these solutions were further diluted with mobile phase to get appropriate concentrations.

Preparation of sample solution

Ten tablets were weighed and powdered, powder equivalent to 53.3 mg of rosiglitazone and 1601.2 mg of gliclazide in a 100 mL volumetric flask. Then the drugs were dissolved by using methanol and the volume was made up to the mark with methanol. 5 mL of this solution further diluted to 25 mL with same solvent.

20 µL of solution was injected into HPLC system to obtained chromatogram for standard drug solution and sample solution. Concentration of rosiglitazone and glicliazide in the formulation was calculated by comparing AUC of the sample with that of the standard.

Method validation

Linearity and range of method was determined on standard solution by analyzing 80 to 120% of test concentration and the calibration curve was plotted using AUC *versus* concentration of standard solution (Figure 2 & 3). Accuracy of method was ascertained by recovery study by adding a known amount of standard drug (±20% of test concentration) to pre-analysed sample and reanalyzing the samples by the proposed method. Precision was studied by analyzing five replicates of standard solution. Specificity was carried out by injecting placebo solution. The chromatographic parameters were also validated by system suitability studies (Table 1) which were carried out on freshly prepared standard stock solution.

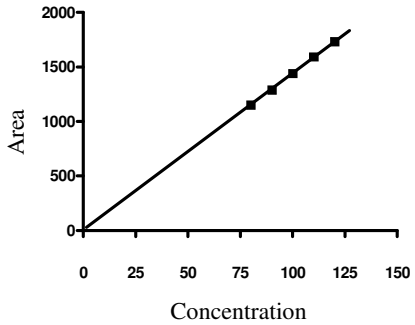

Figure 2. Linearity graph of rosiglitazone.

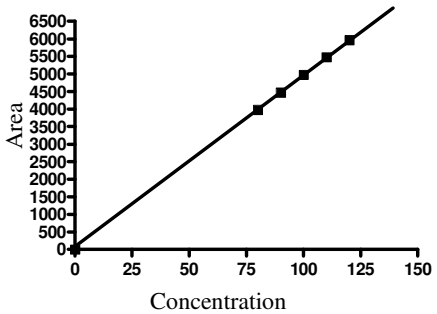

Figure 3. Linearity graph of gliclazide.

Table 1. System suitability.

S.No	Parameters	Obtained values	
		Rosiglitazone	Gliclazide
1	Retention Time	3.74 min	7.667 min
2	Area	1441.226	4959.494
3	Standard Deviation	17.31017	9.780473
4	RSD	1.20	0.19

Results and Discussion

The typical chromatogram obtained from the formulation is presented in Figure 4 (Rosiglitazone) and Figure 5 (Gliclazide). The retention time for rosiglitazone and gliclazide was found to be 3.74 and 7.667 minutes respectively. For the evaluation of linearity, five different concentrations of standard solution were prepared in the concentration range of 80-120 µg/mL for rosiglitazone and gliglazide with correlation of 0.9998 for rosiglitazone and 0.99998 for gliclazide (Figure 2 & 3). Accuracy of the method was ascertained by recovery study (n=3) (Table 2). The concentration of the spiked to the sample was 80-120 µg/mL of the assay level. Recovery data for the study is reported in Table 2. The method was found to be accurate with percent recoveries between 99.99% and 99.997%. There was good repeatability of proposed method with percentage RSD 1.2 for rosiglitazone and 0.197 for gligliazide (Table 3). The limit of detection (LOD) and limit of quantification (LOQ) of rosiglitazone and gliclazide were found to be 4.07 µg/mL and 1.19 µg/mL, 3.612 µg/mL respectively. The result of specificity studies indicated no interference from excipients and mobile phase. The response was due to individual components only. Linearity graph of rosiglitazone and gliclazide are shown in Figure 2 & 3.

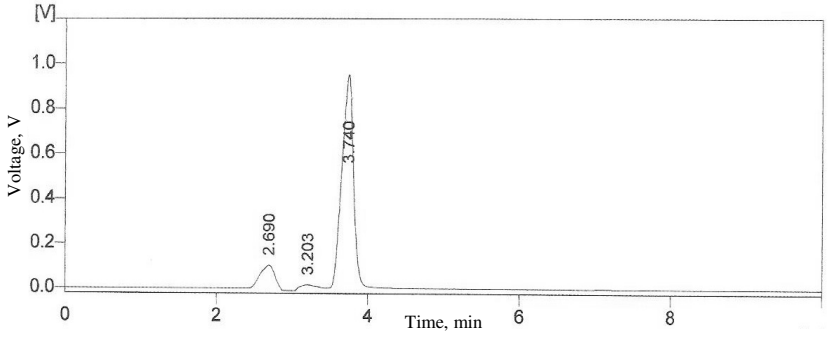

Figure 4. HPLC chromatogram for standard (Rosiglitazone).

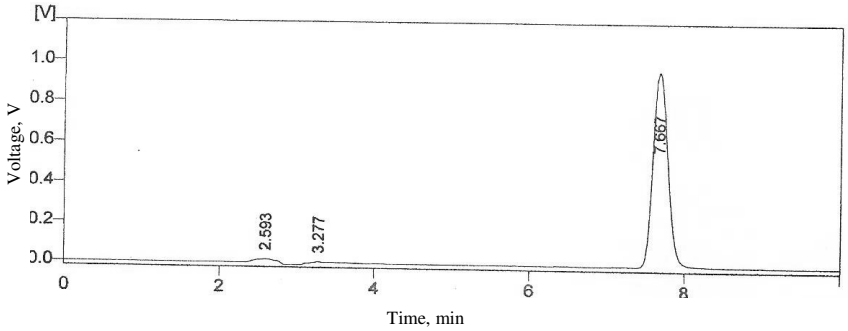

Figure 5. HPLC chromatogram for standard (Gliclazide).

Table 2. Accuracy.

Spiked amount, %	Percentage recovery		Statistical analysis	
	Rosiglitazone	Gliclazide	Rosiglitazone	Gliclazide
80	101.392	100		
80	99.29	99.99	Mean = 99.99	Mean = 99.97
80	99.31	100.00		
100	100.66	100.116		
100	99.467	99.67	Mean = 99.997	Mean = 99.99
100	99.862	100.21		
120	99.80	100.15		
120	100	99.89	Mean = 99.96	Mean=99.997
120	100.1	99.95		

Table 3. Repeatability.

S.No	Area		Acceptance Criteria
	Rosiglitazone	Gliclazide	
1	1434.559	4964.955	
2	1426.55	4954.559	
3	1463.836	4961.811	% RSD should not
4	1462.234	4955.494	be more than 2.0%
Mean	1441.225	4959.494	
%RSD	1.2%	0.197%	

Conclusion

The proposed, the developed HPLC method is simple, liner, accurate, sensitive and reproducible. Thus, the developed method can be easily used for the routine quality control of bulk and tablet dosage from of rosiglitazone and gliclazide within a short analysis.

Acknowledgement

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