ANALYTICAL METHOD DEVELOPMENT AND VALIDATION OF NICARDIPINE BY RP HPLC METHOD

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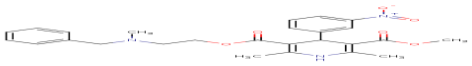
ABSTRACT

A new method was established for estimation of Nicardipine by RP-HPLC method by using Biorelevent Dissolution Media (FaSSIF). The chromatographic conditions were successfully developed for the separation of Nicardipine by using Kromosil C_{18} 4.5×150 mm 5.0 µm, flow rate was 0.8ml/min, and mobile phase ratio was 65:35% v/v methanol: water, detection wavelength was 265nm. The instrument used was WATERS HPLC Auto Sampler, Separation module 2695, photo diode array detector 996, Empower-software version-2. The retention times were found to be 2.428 mins. The % purity of Nicardipine was found to be 99.87%. The system suitability parameters for Nicardipine such as theoretical plates and tailing factor were found to be4146, 1.23, the. The analytical method was validated according to ICH guidelines (ICH, Q2 (R1)). The linearity study of Nicardipine was found in concentration range of 30µg-150µg and correlation coefficient (r^2) was found to be 0.997, % recovery was found to be 100.4%, %RSD for repeatability was 0.5, % RSD for intermediate precision was 1.0. The precision study was precision, robustness and repeatabilty.LOD value was 2.97 and LOQ value was 9.92.Hence the suggested RP-HPLC method can be used for routine analysis of Nicardipine in API and Pharmaceutical dosage form.

KEYWORDS: Kromosil $C_{18,}$ Nicardipine, RP-HPLC

INTRODUCTION

Chemically Nicardipine is 2-(benzyl (methyl) amino) ethyl methyl 1, 4–dihydro-2, 6-dimethyl-4-(3-nitrophenyl) pyridine-3, 5- dicarboxylate hydrochloride1 . The drug was found to be freely soluble in methanol, ethanol, chloroform and water, while it was insoluble in 0.1 N sodium hydroxide. Nicardipine belongs to the class of Calcium Channel Blockers.



Nicardipine

MATERIALS AND METHOD

INSTRUMENTATION

HPLC-auto sampler –UV detector, Separation module2695, UV.detector 2487, Empower-software version-2 Waters. U.V double beam spectrophotometer: M.wave soft ware Lab India. pH meter: ADWAModel number AD102U, Digital Weighing machine:a Model number ER200A.

CHEMICALS

Nicardipine, KH_2PO_4, Water and Methanol for HPLC, Acetonitrile for HPLC, Ortho phosphoric Acid, K_2HPO_4.

Optimized chromatographic conditions

Column	:	Kromosil C_{18} 4.5×150 mm 5.0 µm
Column temperature	:	Ambient
Wavelength	:	265 nm
Mobile phase ratio	:	65:35% v/v methanol: water
Flow rate	:	0.8 min/ml
Auto sampler temperature	:	Ambient
Injection volume	:	20µl
Run time	:	6 minutes

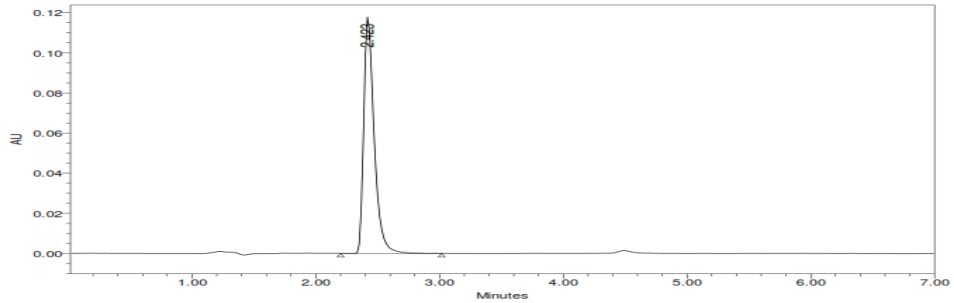


Fig. 1.Chromatogram Showing Optimised injection

Preparation of the Nicardipine sample solution

Sample solution preparation

10 mg equivalent Nicardipine capsule powder were accurately weighed and transferred into a 10ml clean dry volumetric flask, add about 1ml of diluent and sonicate to dissolve it completely and making volume up to the mark with the same solvent(Stock solution). Further pipette 1 ml of the above stock solution into a 10 ml volumetric flask and was diluted up to the mark with diluent.

METHOD VALIDATION

- Specificity
- Linearity
- Range
- Accuracy
- Precision
- Repeatability
- Intermediate Precision
- Detection Limit
- Quantitation Limit
- Robustness

RESULTS AND DISCUSSION

VALIDATION

Linearity

Table .1 Showing the results for the linearity

Name	**Rt**	**Area**
Nicardipine	2.428	1608152
Nicardipine	2.422	2592905
Nicardipine	2.430	3778327
Nicardipine	2.426	5170038
Nicardipine	2.433	6249400
Co efficient of correlation (R^2)		**0.997**

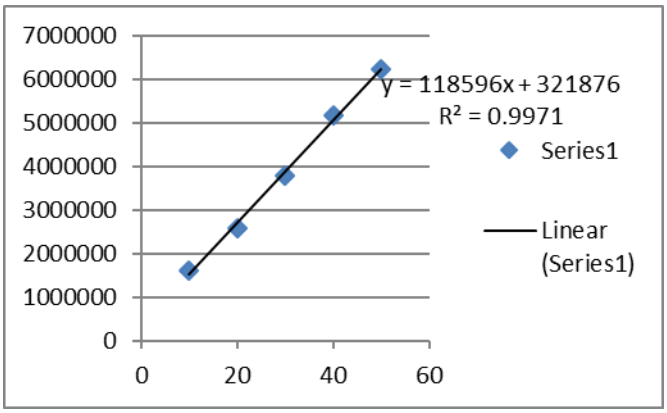


Fig.2. Plotting of calibration graph for Nicardipine

Accuracy

Table.2. Showing accuracy results for Nicardipine

%Concentration (at specification level)	Average area	Amount added (mg)	Amount found (mg)	% Recovery	Mean recovery
50%	1048287	5	5.14	100.2%	100.4%
100%	1378200	10	10.01	98.8%	
150%	1715480	15	15.2	96.5%	

Precision

Table.3. Showing the results for precision

	Name	RT	Area
1	Nicardipine	2.423	693078
2	Nicardipine	2.424	693338
3	Nicardipine	2.424	695080
4	Nicardipine	2.424	694843
5	Nicardipine	2.423	695336

Mean			**694335**
Std.Dev.			**1047.5**
%RSD			**0.15**

Ruggedness (intermediate precision)

Table .4. Showing the results for id precision

	Name	**RT**	**Area**
1	Nicardipine	2.423	693877
2	Nicardipine	2.424	696531
3	Nicardipine	2.424	693977
4	Nicardipine	2.424	695278
5	Nicardipine	2.423	697676
Mean			**695468**
Std.Dev.			**1642.7**
%RSD			**0.24**

Detection limit

Table .5. Showing results for Limit of Detection

Drug name	**Standard deviation(σ)**	**Slope(s)**	**LOD(µg)**
Nicardipine	371827.90	563365963	2.97

Quantitation limit

Table.6. Showing results for Limit of Quantitation

Drug name	**Standard deviation(σ)**	**Slope(s)**	**LOQ(µg)**
Nicardipine	371827.90	563365963	9.92

Robustness

Table.7. Showing system suitability results for Nicardipine

S. No	Flow rate (ml/min)	System suitability results	
		USP Plate Count	USP Tailing
1	0.8	4352	1.1
2	**1**	**4024**	**1.2**
3	1.2	3730	1.2

Table. 8. Showing system suitability results for Nicardipine

S. No	Change in organic composition in the mobile phase	System suitability results	
		USP Plate Count	USP Tailing
1	10 % less	4331	1.20
2	***Actual**	**4024**	**0.87**
3	10% more	3693	1.26

SUMMARY AND CONCLUSION

The developed method was found to be rapid, accurate, precise and reproducible. The method was linear over a wide concentration range, economical and utilizes a mobile phase which can be easily prepared. All these factors make this method suitable for the estimation of nicardipine in API and Pharmaceutical dosage form by using Biorelevent Dissolution Media (FaSSIF). The developed method can be used for the routine analysis and assay of nicardipine in quality control laboratories.

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