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Rapid RP-HPLC Method for Estimation of Nisoldipine from Tablet Dosage Form

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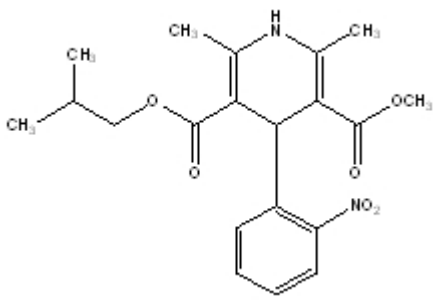
ABSTRACT

A new reverse phase HPLC method is developed for the rapid estimation of Nisoldipine, a calcium channel blocker from tablet dosage formulation. Standard solution of concentration 1 mg/mL was prepared in methanol. The analysis was carried out on a Grace Column (4.6 mm I.D x 250 mm) C-18 column using mobile phase Methanol, Acetonitrile and Water. The flow rate was maintained at 1.0 ml/min. Detection was monitored at 237 nm. The retention time of drug was found to be 3.94±0.002 min. The validation of t he proposed method was in terms of linearity and range, accuracy and precision. The drug showed the linear response over the concentration range from 20 to 80 µg/mL. The percentage recovery obtained for drug from tablet formulation was 98.75 with relative standard deviation of less than 1%. Since the analysis is completed within 5 minute, the proposed method could be employed for routine analysis Nisoldipine from tablet formulation.

Key words: Nisoldipine, RP-HPLC, Validation.

INTRODUCTION

Nisoldipine is an extended-release tablet dosage form of the dihydropyridine calcium channel blocker. Nisoldipine is (±)-Isobutyl methyl 1,4-dihydro-2,6-dimethyl-4-(*o*-nitrophenyl)-3,5-pyridinedicarboxylate, $C_{20}H_{24}N_2O_6$ and has the structural formula:



Nisoldipine is a yellow crystalline powder, practically insoluble in water, but soluble in acetone, ethanol and methanol. It has a molecular weight of 388.4. Nisoldipine extended-release tablets are film-coated monolithic tablets containing a hydrogel which provides for the controlled

release of the drug. Nisoldipine extended-release tablets contain 40 mgm of nisoldipine. Nisoldipine is a member of the dihydropyridine class of calcium channel antagonists (calcium ion antagonists or slow channel blockers) that inhibit the transmembrane influx of calcium into vascular smooth muscle and cardiac muscle. It reversibly competes with other dihydropyridines for binding to the calcium channel. Because the contractile process of vascular smooth muscle is dependent upon the movement of extracellular calcium into the muscle through specific ion channels, inhibition of the calcium channel results in dilation of the arterioles.

Literature survey revels only few analytical methods have been developed for the determination of nisoldipine in human plasma by using liquid or gas chromatography with mass spectrometry, following a liquid–liquid extraction[1-2]. The estimation of nisoldipine in formulation was done by spectrophotometric method [3] based on the reaction of nisoldipine with DMSO and potassium hydroxide to form dark yellow chromogen followed by measuring the absorbance at 430nm, reaction of nisoldipine with 4-Dimethyl aminobenzaldehyde to give a yellow colored chromogen having maximum absorbance at 400nm. UV spectrophotometric [4] method was reported using ethanol and absorbance measured at 237 nm. Reverse phase HPLC [5] using mobilephase water, acetonitrile and methanol (40:40:20). Hence it was thought worth while to develop simple cost effective HPLC method by using different mobile phase.

MATERIALS AND METHODS

Chemicals and reagent

Pure drug sample of Nisoldipine was supplied by the Exela Pharmsci. Pvt. Ltd. Bangalore, India. HPLC grade methanol, acetonitrile, water was purchased from E.Merck. Formulation product (tablet- Sular) were purchased from USA.

Standard Solution

An accurately weighed 100 mg of pure drug sample of nisoldipine was dissolved in 50 mL of methanol. The solution was sonicated for 30 minutes. The solution was filtered through Whatman filter paper, volume of the filtrate made up to 100 mL with methanol (1 mg/mL). 0.2, 0.4, 0.5 0.6, 0.8,mL of the stock solution was diluted to 10mL with methanol. It was filtered through 0.45µ membrane filter and filtrate was used for analysis.

Chromatographic conditions:

The following Chromatographic conditions were maintained for analysis of drug throughout the experimental work.

System : Shimadzu HPLC Model LC-10AT(VP)
Column : Grace (4.6 mm I.D x 250 mm) C-18
Detector : Variable wavelength programmable UV/VIS detector SPD-10A (VP series)
Mobile phase : Methanol + Acetonitrile + Water (60:30:10)
Detection wavelength : 237 nm
Mode : Isocratic
Syringe : Hamilton syringe. (705 NR,50 µL)
Flow rate : 1.0 ml/min.
Injector : Rheodyne-7725i
Type of Injector: Manual
Temperature : Room temperature

Selection of mobile phase

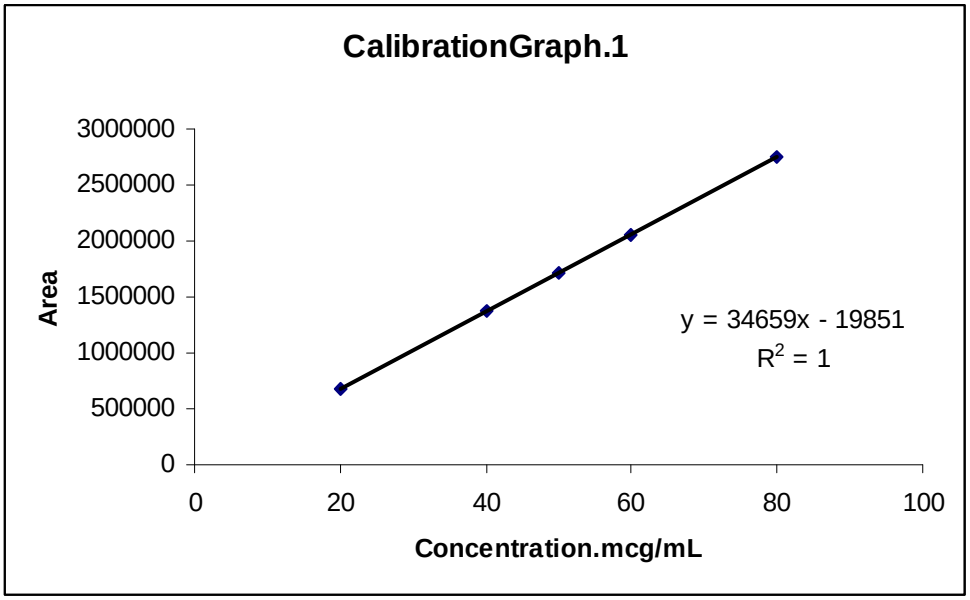
For the selection of mobile phase, various solvents individually and in combinations were tried and a mobile phase Methanol: Acetonitrile Water (60:30:10) was selected for study, as the drug was eluted within a time period of 5 minutes with sharp peak.

System suitability parameters

According to USP, system suitability tests were carried out on standard stock solution of nisoldipine. About 20 µL of the solution was injected into the chromatographic conditions[6]. Parameters studied to evaluate the suitability of system were retention time, area under curve, asymmetry, capacity factor and number of theoretical plates. (Table-1). Acceptance criteria for system suitability, Asymmetry not more than 2.0, theoretical plate not less then 4000 and % RSD of peak area not more then 2.0, were full fill during all validation parameter[7]

Table 1. Study of system suitability parameters

S. No	Name	Mean
1	Retention time	3.9446
2	Area	688762
3	Asymmetry	1.3385
4	Capacity factor	0.2476
5	Theoretical plates	7675
6	Tail factor	1.2042



Linearity and Range

Linearity of the method was studied by injecting five concentrations of the drug prepared in the methanol in the range 20- 80 µg/mL into the HPLC system by injector by keeping the injection volume constant (20 µL). The peak areas were plotted against the corresponding concentrations to obtain the calibration graphs. Graph- 1.The results are given in **Table 2**.

Table-2 Linearity and Range Study

S. No	Name	Result
1	Range	20-80 µg/mL
2	Coefficient of Correlation	0.9999

Assay of tablets

Twenty tablets of nisoldipine were weighed and crushed to fine powder. On the basis of labeled claim, powder equivalent to 100 mg of nisoldipine was taken in a volumetric flask and was dissolved in about 20 mL methanol. The solution was sonicated for 30 minutes. The solution was filtered through whatman filter paper, volume of the filtrate made up to 100 mL with methanol (1 mg/mL). 0.2, 0.4, 0.5 0.6, 0.8, mL of the sample solution was diluted to 10mL with methanol. It was filtered through 0.45µ membrane filter, and filtrate was used for analysis.

Method

The above mentioned chromatographic conditions were set and mobile phase was allowed to equilibrate with the stationary phase as indicated by steady base line. 20 µL of each standard and sample solution were injected separately and the chromatograms were recorded. The retention time for nisoldipine was found is 3.944+0.002 min. From the corresponding areas obtained in standard and sample chromatograms, the amount of drug was calculated. The results of analysis of tablet formulations are given in **Table 3**.

Recovery

To study the accuracy and precision of the proposed method, recovery study was carried out by addition of standard drug solutions to pre analyzed sample. Results of recovery studies are shown in **Table 3**.

Table 3. Analysis of Nisoldipine tablet formulation

Sample	% Drug estimated	% Recovery
Nisoldipine	98.75	98.50

RESULTS AND DISCUSSION

The mobile phase Methanol: Acetonitrile Water (60:30:10) was selected, because it was found to give sharp peaks of nisoldipine with retention time of 3.944 ± 0.002 min. Wavelength was selected by scanning standard solution of drugs over 200 nm to 400 nm. The compound show good response at 237 nm. The low value of standard deviation indicates system suitability parameters are stable over the given chromatographic conditions. The value of coefficient of correlation reflects the method is linear over the concentration range of 20-80 µg/mL. The percentage recovery of drug from formulation, close to 99.0%, and its low relative standard deviation values, indicates a high accuracy of the method.

CONCLUSION

The proposed RP-HPLC method is simple, sensitive, precise and accurate. Since the analysis is completed within 5 minutes, it clearly indicates that the method is rapid and thus it could be used for routine analysis of nisoldipine from bulk drug and tablet dosage form.

REFERENCES

[1] Heinig.R,, Muschalek.V and . Ahr.G. *J. Chromatogr B.*, **1994**.655, 286.
[2] Marques.M.P, Santos. N. A,. Coelho. E. B, Bonato P. S and Lanchote L *J.Chromatogr B.*, **2001**.87,762.
[3] Niraimathi.V,. Jerad Suresh.A,. Nanjappan.K Kokila.R and Latha.T, *Research J. Pharm. and Tech.***2011** 4(5):762 .
[4] Mohammed MShafi. *Der Pharma Chemica***.2011** 3(4), 275-278**.**

[5] Niraimathi.V, Jerad Suresh A and Nanjappan. K. *Journal. Pharm. Research*. **2011** 10(1).14-15**.**
[6] Manwar.J.V,. Sonawane.B.V, Patil. S.V and. Takle. S.P *Der Chemica Sinica***, 2011,** 2(5): 152-156
[7] Govind J.Kher, Vijay R. Ram , Gaurang P. Pandya; and Hitendra S. Joshi. *Der Chemica Sinica*, **2011**, 2(5):65-74.