INDO AMERICAN JOURNAL OF PHARMACEUTICAL RESEARCH

UV SPECTROPHOTOMETRIC METHOD FOR QUANTIFICATION OF AZELNIDIPINE IN TABLETS

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ARTICLE INFO

Article history
Received 22.08.2024
Available online
30.11.2024

Keywords
Azelnidipine (AZEL),
UV Spectrophotometric Method,
ICH Guidelines.

ABSTRACT

A simple, rapid, precise and reproducible UV-Spectrophotometric method was developed for determination of Azelnidipine (AZEL) in bulk and tablet dosage form using UV Visible Spectrophotometer (UV-1700) using methanol and ortho-phosphate buffer (pH 6.5) in ratio of 50:50 and the absorbance was measured at 256nm. The method was validated as per ICH (Q2R1) guidelines and all the parameters for validation were found to be within acceptance criteria limit. The percentage assay for Azelnidipine was found to be 100.89%w/w, indicating that the excipients in the tablet formulation did not interfere with assay values in this method. Hence the method was found to be accurate, precise, sensitive and robust and can be successfully used for the determination of Azelnidipine in bulk and in pharmaceutical formulations (tablets).

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*Please cite this article in press as **Dr. Mubeen G** et al. UV Spectrophotometric Method for Quantification of Azelnidipine in Tablets. Indo American Journal of Pharmaceutical Research.2024:14(11).*

INTRODUCTION

AZELNIDIPINE is official in IP 2014. Azelnidipine chemically (±3-[1-[di(phenyl)methyl]azetidine-3-yl]5-propan-2-yl,2-amino-6-methyl-4-(3-nitrophenyl)-1,4dihydropyridine-3,5dicarboxylate),adihydropyridine calcium channel antagonist used as antihypertensive agent but without increasing pulse rate.

This project work describes thedevelopment and validation of a new UV-Spectrophotometric method as per ICH guidelines for determination of Azelnidipinein bulk and in formulation (tablets).

INSTRUMENTS USED :

- Weighing balance (Sartorius-TE 214 S)
- UV-Visible Spectrophotometer (Shimadzu-1700, Software Version-UV Probe 2.34)

CHEMICALS AND REAGENTS USED:

Methanol, Phosphate Buffer , Azelnidipine (Standard) , Azelnidipine Tablets (Marketed Solid Dosage Formulation (tablets).

METHODOLOGY:

Several trials with different solvent system were tried and methanol & ortho-phosphate buffer 10Mm (pH 6.5) in ratio (50:50) showed good absorbance. The standard solution of AZEL (10µg/ml) in methanol & ortho-phosphate buffer 10Mm (pH 6.5) (50:50) was scanned in the UV region of 200-400 nm using UV-Visible Spectrophotometer. The maximum absorbance was found to be at 256 nm. Hence, 256 nm was selected asmaximum wavelength for AZEL determination .The spectrum obtained is presented in fig(1).

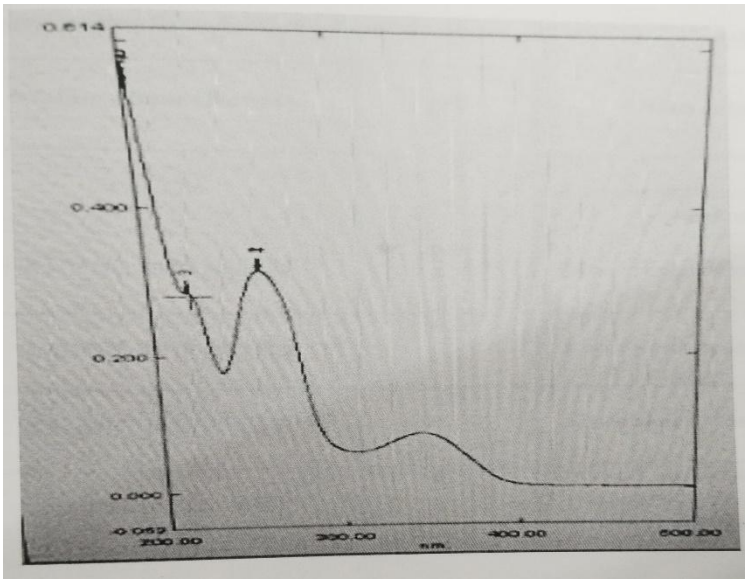

Fig 1: UV spectra of Azelnidipine in methanol : buffer (pH 6.5) 50:50.

Preparation of standardAZEL Solution:

Accurately weighed 0.01 gm.Of AZEL standard was transferred into 10ml volumetric flask, the volume was made up to the mark with the solvent system containing methanol &buffer was added in ratio of 50:50 and was sonicated for 2 min to dissolve it completely, to get 1mg/ml of standard AZEL solution and labeled as **STD STOCK SOLUTION**. Further 0.1 ml was diluted to 10ml with solvent system to get 10µg/ml solution.

Preparation of Buffer (10mM PHP):

Accurately weighed 680mg of potassium di hydrogen orthophosphate and transferred into 500 ml. volumetric flask, 200-300 ml. double distilled water was added and sonicated for 5 min to dissolve it fully. Finally, the volume was made up to 500ml mark with double distilled water.

Preparation of 1% NaOH:

1gram of NaOH was weighed accurately, transferred into a 100ml. volumetric flask, 25ml of water was added to dissolve and the volume was made up to 100ml with distilled water and labelled.

Preparation of sample AZELsolution:

10 tablets were weighed and average weight of one tablet was calculated. The tablets were finely triturated and accurately weighed, a quantity of powder containing 0.01 gm. of AZELtransferred to 10 ml volumetric flask, solubilized with solvent and volume was made up to 10 ml mark, was filtered using Whitman filter paper & labeled as **SAMPLE STOCK SOLUTION.** . Further 0.1 ml was diluted to 10ml with solvent system to get 10µg/ml solution.

The developed UV spectrophotometric method was validated for various validation parameters as per ICH (Q2R1) guidelines and the results obtained for all validation parameters are tabulated in (**Table 1)**

Linearity and range:

AZEL was observed to be linear in concentration range of0.5-50µg/ml and correlation coefficient was found to be well within the acceptance criteria of NLT 0.997.

Limit of detection & limit of quantitation:

The detection limit of an individual analytical procedure is the lowest amount of analyte in a sample which can be detected but not necessarily quantified as an exact value.

The quantification limit of an individual analytical procedure is the lowest amount of analyte in a sample which can be quantitatively determined with suitable precision and accuracy.

LOD=(3.3×SD)/slope. **LOQ = 10 × (SD/Slope).**

Where, SD= Standard deviation of Y-intercept of 6 calibration curve values.
Slope= the mean slope of the 6 calibration curve values.

Precision:

The precision of the analytical method was studied by performing inter-day, intra-day precision, repeatability studies & reproducibility studies.

Inter-day & intra-day precision:

It can be inferred that as the %RSD for intra-day and inter-day studies for AZEL was within the acceptance criteria of less than 2%. Hence, it can be concluded that the developed method was found to be precise during intra and interday studies.

Repeatability:

The %RSD values for Absorbance for six replicate solutions of AZEL was found to be within the acceptance limit, hence the method was found to be precise during repeatability studies.

Reproducibility:

The %RSD values for absorbance by different Analyst Ⅰ & Ⅱ was found to be within the acceptance limit, hence the method was found to be reproducible.

Robustness:

The %RSD for absorbance was found to be less than 2% which is well within acceptance criteria. Hence the method was found to be robust with small deliberate changes in solvent system ratios.

Accuracy:

To check the accuracy of the proposed method, recovery studies were carried out at three different levels i.e. 80%, 100% and 120%. The standard bulk drug was added at 3 different levels to the pre-analyzed sample solution and then reanalyzed and the percentage recovery was determined. The % recovery of AZEL at three different levels was found to be well within the acceptance criteria limits of 95-105% w/w. Hence, the method is found to be accurate.

Sandell's Sensitivity:

The Sandell's sensitivity value was found to be 0.000207 µ/cm^2 indicating that the developed & validated method is sensitive & give good results with small concentration of AZEL.

$$\text{Sandell's Sensitivity} = \frac{\text{Concentration of the drug}}{\text{Absorbance}} \times 0.001$$

(µg/cm^2)

Table 1:Results ofValidation parameters for AZEL.

Validation Parameters	AZEL Data
Correlation coefficient (r^2)	0.9982
Linearity& Range	1-20 µg/ml
LOD(µg/ml)	0.0126
LOQ(µg/ml)	0.0384
Interday (%RSD)	0.32
Intraday(%RSD)	0.119
Repeatability(%RSD)	1.64
Reproducibility(%RSD)	
Analyst- Ⅰ	0.118
Analyst-Ⅱ	0.120
Robustness(%RSD)	
Change in ratio of solvents	0.923
Change in pH of buffer	0.919
Accuracy (% Recovery) %w/w	
80%	100.62
100%	99.7
120%	99.08
Sandell's Sensitivity ($\mu g/cm^2$)	0.000207

Assay ofAzelnidipine in Marketed Formulations

AZUSA (tablets) Label claim: 8mg, by Ajanta Pharma Ltd

0.1 ml of sample stock solution containing (1mg/ml) was taken in 3 different 10ml volumetric flasks and the volume was made up with the solvent Methanol: ortho-phosphate buffer 10Mm (pH 6.5) (50:50) to the mark. The absorbance was measured and % Assay & the % RSD for assay was calculated tabulated in (**Table 2).**

$$\% \text{ Assay} = \frac{\text{Abs of sample} \times \text{Conc. of standard} \times \text{DF} \times \text{Avg wt.} \times 100}{\text{Abs. of standard} \times \text{weight of sample (gm.)} \times \text{Label claim}}$$

Table 2: Assay results forAZEL in tablet formulation.

SL .No	CONC (µg/ml)	ABSORBANCE *	% ASSAY (% w/w)
1.	10	0.422	99.78
2.	10	0.422	99.78
3.	10	0.423	103.12
MEAN	0.422		
% RSD	1.911%		

The percentage assay for AZEL in tablets was found to be 99.78 to 103.12 % w/w which is well within the acceptance criteria of 95-105% w/w and the %RSD for assay value was 1.911% which is well within the acceptance criteria of NMT 2%.

CONCLUSION

- A UV-spectrophotometric method for determination of Azelnidipine in bulk and formulation was developed and validated successfully using Shimadzu 1700 UV-Visible Spectrophotometer.
- The solvent system comprising of methanol and ortho-phosphate buffer 10Mm (pH 6.5) in the ratio of 50:50 was used and UV detection was at 256nm. The developed method was validated as per ICH (Q2R1) guidelines. The results obtained for all validation parameters, were found to be within the acceptance criteria.
- Thus the proposed method was found to be accurate, linear, precise, robust and can be successfully applied for the routine analysis of Azelnidipine in bulk and Pharmaceutical formulation(tablets).

REFERENCES

1. TheIndian Pharmacopeia Commission, 2014, 2:1115-1116Sources:https://go.drugbank.com/drug/DB09230 https://pubmed.ncbi.nim.nih.gov/1463080
2. en.m.wikipedia.org
3. International Conference on Harmonization Q2 (R1) Harmonised tripartite guidelines, validation of analytical procedure, text and methodology, Geneva, 2005.
4. Imdad Husen Mukeri, Amit Kumar Kushwaha, Netra Prasad Neupane, Ashutosh Kumar, Allen Sushant, Anant Nag and P Malairajan. Analytical method development and validation of Azelnidipine by UV-Visible spectroscopy, WJPR, 2021, 10(10), 858-72.
5. Kreya HP and Rajvi JM. A review on analytical methods for estimation of Azelnidipine and Telmisartan in pharmaceutical dosage form, 2021, WJPR, 10(4), 589-604.
6. Drashti Mandale, Rujuta Mistry and Dr. Nidhi Chauhan. An analytical approach of Azelnidipine- A Review, WJPPS, 2021,10(3), 682-92.
7. Dibiya, Dhiman Halder, Himangshu Sekhar Maji, Pintu Kumar De, Tapan Kumar Pal. Special Emphasis on Bioanalytical Method Development and Validation of an Anti-Hypertensive Drug Azelnidipine by LC-ESI-MS/MS in Healthy Human Volunteer's Blood Plasma, Research J. Pharm and Tech, 2021, 14(7), 3571-77.
8. Akshay S Rane and Dr Sunil K Mahajan. Validation and forced stability-indicating HPTLC method for determination of Azelnidipine, WJPR, 2016, 5(9), 1053-62.
9. Jenisha Modi, Shivangi K Patel, Namrata Parikh, Shreya R Shah, Prasanna K Pradhan and UM Upadhyay. Stability indicating analytical method development and validation for estimation of Azelnidipine, WJPR, 2016, 5(2), 831-47.