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# Validated RP- HPLC Method for the Quantitative Estimation of Valsartan in Bulk and Pharmaceutical Dosage Forms

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**ABSTRACT:** A simple, specific, accurate, precise and sensitive Reverse Phase High Performance Liquid Chromatographic method has been developed for the quantitation of Valsartan in both pure and pharmaceutical dosage forms. A Venusil XBP C-18, 5 µm column having 250 × 4.6 mm internal diameter in isocratic mode with mobile phase containing 0.1M Phosphate buffer: Acetonitrile (20: 80). The flow rate was 1.0 ml / min and the effluents were monitored at 273 nm. The retention time was 4.95 min. The linearity was in the range of 50-150 mcg / ml. This method was validated for linearity, precision, limit of detection, limit of quantitation, accuracy, ruggedness and robustness. Statistical analysis proves that the method is reproducible and selective for the estimation of the said drug.
**KEY WORDS**: RP-HPLC, Valsartan, Validation.

## INTRODUCTION AND EXPERIMENTAL

Valsartan is an antihypertensive agent and is used as angiotensin-II antagonist. The chemical name of Valsartan is 3-methyl-2-[pentanoyl-[[4-[2-(2H-tetrazol-5-yl) phenyl] phenyl] methyl] amino]-botanic acid. It has a molecular formula of $C_{24}H_{29}N_5O_3$ and a molecular weight of 435.519 g / mol and its structure was given in Figure: 1. Valsartan is a white or almost white powder. It is freely soluble in Ethanol, Methanol, Acetonitrile and sparingly soluble in Water[1]. The drug is officially listed in monograph of USP[2]. Several analytical methods that have been reported for the estimation of Valsartan in biological fluids or pharmaceutical formulations include High Performance Liquid Chromatography, LC-MS, UV-Visible Spectrophotometry[3-13]. The objective of the work was to develop simple, accurate, precise and economic RP-HPLC method with lesser run time to estimate the Valsartan in bulk and pharmaceutical dosage forms.

A Shimadzu HPLC model containing LC-20 AT pump, variable wavelength programmable UV / VIS detector and Rheodyne injector was employed for the investigation. All the chemicals used in the investigation were of HPLC grade. The chromatographic analysis was performed on a Venusil XBP C-18 (250 X 4.6 mm, 5 µm) column. The mobile phase consisting of 0.1M Phosphate buffer and Acetonitrile in the ratio of 20: 80 v / v was selected. The optimized chromatographic conditions are summarized in Table.1.

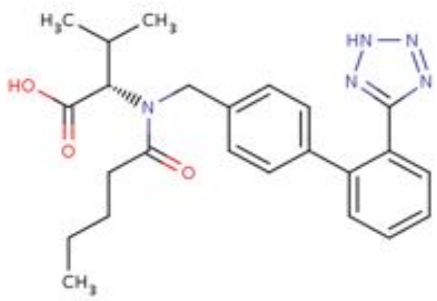


**Fig. 1: Chemical Structure of Valsartan**

The standard solution of Valsartan was prepared by dissolving 10 mg in 100 ml of mobile phase to give the concentration 100 mcg / ml. The mobile phase and the solution were sonicated for 10 min and filtered using whatman filter paper No.41. The various dilutions of Valsartan in the concentration of 50, 75, 100, 125 and 150 mcg / ml were prepared. The solutions were injected using a 20 µl fixed loop in to the chromatographic system at the flow rate of 1.0 ml / min and the effluents were monitored at 273 nm, chromatograms were recorded. The Valsartan was eluted at 4.95 min as shown in Figure: 2. The calibration curve was constructed by plotting average peak area versus concentration and was presented in Figure: 3 with its computed regression equation. The method was extended for determination of Valsartan in pharmaceutical dosage form. The pharmaceutical dosage form containing 160 mg strength was taken.

Twenty tablets each of two different brands (containing 80 mg and 160 mg respectively) were taken, powdered in a mortar and the powder equivalent to 10 mg of Valsartan was transferred into 100 ml volumetric flask containing 50 ml of mobile phase and flask was kept for Ultrasonication for 15 min, then it was diluted up to the mark with mobile phase and the solution was filtered through Whatman filter paper No. 41. From this solution various dilutions were made with the mobile phase, which were analysed. The concentration of the drug in tablet sample solution was calculated by comparing the peak area of standard. The proposed methods were validated as per the ICH guidelines[14-16].

**RESULTS AND DISCUSSION**

A suitability test was applied to representative chromatograms for various parameters. The results obtained were within acceptable limits (Table 2). Thus, the system meets suitable criteria. The calibration curve was obtained for a series of concentration in the range of 50-150 mcg / ml and it was found to be linear. The data of regression analysis of the calibration curves are shown in Table 3. The precision was measured in terms of repeatability, which was determined by sufficient number of aliquots of a homogenous sample. The % RSD was found and lying with in 2. This showed that the precision of the method was satisfactory. The accuracy of the method was inferred by establishing the precision and linearity studies of the standard. The % RSD was less than 2.0. This showed that the recoveries of Valsartan by the proposed methods are satisfactory. Ruggedness and Robustness were determined and the % RSD values were calculated from precision study was less than 2.0. Limit of detection (LOD) and Limit of quantitation (LOQ) were determined by the proposed methods. The results of validation parameters are summarized in Table 4. The results of tablet analysis and recovery studies obtained by the proposed method were validated by statistical evaluation and are given in Table: 5.

Thus it can be concluded that the method developed in the present investigation was simple, sensitive, accurate, rugged, robust, rapid and precise. Hence, the above said method can be successfully applied for the estimation of Valsartan in pharmaceutical dosage forms..

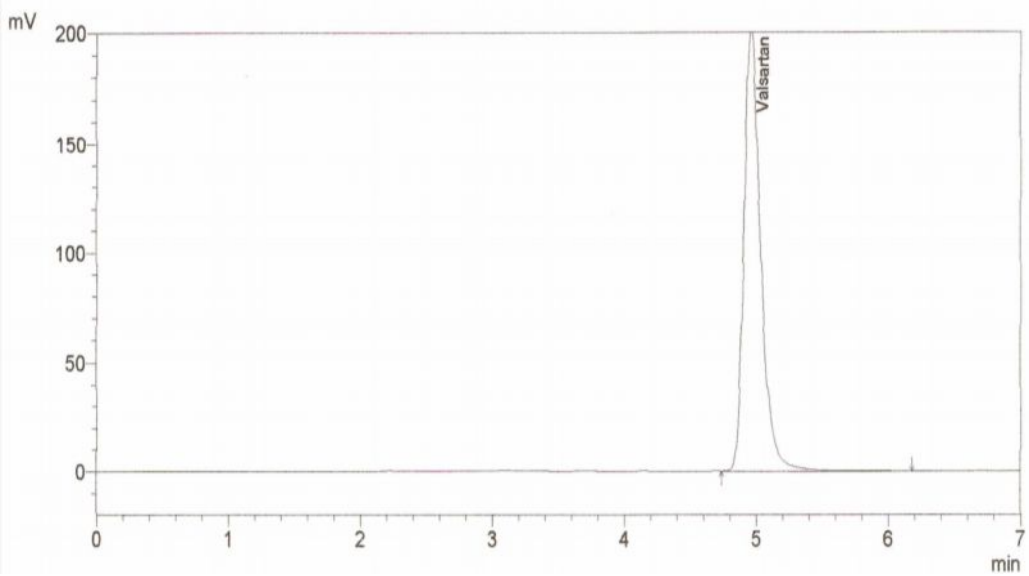


**Fig. 2: Typical RP-HPLC Chromatogram of Valsartan by the proposed method.**

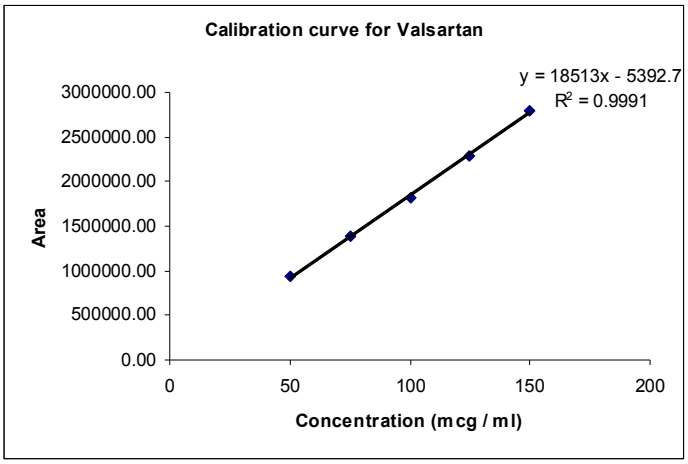


**Fig. 3: Calibration curve of Valsartan by the proposed method.**

**Table 1: Optimized Chromatographic conditions for the proposed method**

| Parameters | Optimized condition |
|---|---|
| Column | Venusil XBP C-18 (250 X 4.6 mm,5µ) |
| Mobile phase | 0.1M Phosphate buffer: Acetonitrile (20:80) |
| Flow rate | 1.0 ml / min |
| Injection volume | 20 µl |
| Detection | 273 nm in UV detector |
| Temperature | Ambient |
| Retention time | 4.95 min |
| Run time | 7 min |

**Table 2: System Suitability Test Parameters for the proposed method**

| Parameters | Values |
|---|---|
| Theoretical plates | 2653 |
| Asymmetric factor | 1.18 |
| Tailing factor | 1.24 |

**Table 3: Regression analysis of the Calibration curve for the proposed method**

| Parameters | Values |
|---|---|
| Linearity range (mcg / ml) | 50-150 |
| Correlation coefficient ($r^2$) | 0.9991 |
| Regression equation | Y= 18513 X – 5392.7 |
| Slope | 18513 |
| Intercept | -5392.7 |

**Table 4: Summary of Validation Parameters for the proposed method**

| Parameters | Values |
|---|---|
| Limit of detection (mcg / ml) | 0.5 |
| Limit of quantitation (mcg / ml) | 1.5 |
| [a]**Precision ( % RSD)** | |
| System precision | 0.22 |
| Method precision | 0.26 |
| [a]**Ruggedness ( % RSD)** | |
| Analyst I | 0.02 |
| Analyst II | 0.13 |
| [a]**Robustness ( % RSD)** | |
| Changed condition I ( ratio of mobile phase) | |
| 30 : 70 (Buffer : Acetonitrile) | 0.83 |
| 10 : 90 (Buffer : Acetonitrile) | 0.01 |
| Changed condition II ( flow rate of mobile phase) | |
| 0.95 ml / min | 0.80 |
| 1.05 ml / min | 0.16 |

[a]Mean of six determinations, RSD indicates relative Standard deviation

**Table 5: Assay Results of Stavudine capsules using proposed method**

| Brand used | Labelled amount (mg) | Amount found (mg) | % Recovery ± SD** |
|---|---|---|---|
| Cap-A | 40 | 40.32 | 100.80 ± 0.35 |
| Cap-B | 160 | 160.91 | 100.57 ± 0.42 |

** *Standard deviation of six determinations*

## REFERENCES


1. http://www.rxlist.com/diovan-drug.htm
2. United States Pharmacopoeia (USP-NF XXIV), Rockville MD 20852; United States Pharmacopoeia Convention Inc.**;** 1985. p. 3445.
3. Tian DF, Tina XL, Wang ZY. Simultaneous determination of Valsartan and hydrochlorothiazide in tablets by RP-HPLC; Int J Pharma sci; 2008; 70(3): 372-74.
4. Darko Vanovic, Andelija Maladroit et al. Monitoring of impurity level of valsartan and hydrochlorothiazide employing an RP-HPLC gradient mode. J Liq Chromatography and related technologies; 2007: 30(19): 2879-90.
5. Piaozz, Lee ES, Tran HT et al. Improved analytical validation and pharmacokinetics of Valsartan using HPLC with UV detector; Arch Pharma Resea 2008: 31(8): 1055-9.
6. Noriko Dane Shtalab, Richard Z, Lewanc ZUK et al. HPLC analysis of angiotensin II receptor antagonist Valsartan using a liquid extraction method. Int J Pharm Sci 2002: 345-49.
7. Sevgi Tatar and Serap Saglik. Comparision of UV and Second derivative-Spectrophotometric and LC methods for the determination of Valsartan in pharmaceutical formulation. J Pharma Biochem Anal 2002: 371-75.
8. Sohan S, Chitlange, Mohammed IM ran, et al. Simultaneous estimation of Ramipril and Valsartan in pharmaceutical dosage form. Ori J Chem 2008: 245-55.
9. Noriko D, Richard ZL, Fakhreddin J. High Performance Liquid Chromatographic analysis of angiotensin II receptor antagonist Valsartan using a liquid extraction method. Anal Tech Biomed and Life Sci 2002: 345-66.
10. Eda S, Sadi A, Nilgun GG et al. Simultaneous determination of Valsartan and hydrochlorothiazide in tablets by first-derivative Ultraviolet Spectrophotometry and LC. J Pharm Biomed Anal 2001: 1009-25.
11. Eric F, Alexander D, Paul R. Development and validation of chiral High Performance Liquid

Chromatographic methods for the quantitation of Valsartan and of the tosylate of valinebenzyl ester. J Chromatogr B Biomed Sci Appl 1996: 686-77.

12. Tatar S, Saglik S. Comparison of UV and Second derivative Spectrophotometric and LC methods for the determination of Valsartan in pharmaceutical formulation. J Pharm Biomed Anal 2002: 330-71.
13. Hao Li, Yingwa Wing, Yao Jiang. A Liquid Chromatography and tandem Mass Spectrometry method for the Simultaneous quantification of Valsartan and Hydrochlorothiazide in human plasma. J Chromatogr B 2007: 436-42.
14. Robert A. Nash and Alfred H. Wachter, Pharmaceutical Process Validation, James Swarbrick, North Carolina, An international 3rd edition, Revised and Expanded, Volume 129, Marcel Dekker, Inc., New York, 507-522.
15. International Conference on Harmonization of Technical Requirements for the Registration of Pharmaceuticals for Human use. Validation of Analytical procedures: Methodology.ICH-Q2B,Geneva(1996);(CPMP/ICH/281/95),Internet: http://www.nihs.go.jp/drug/validation/q2bwww.html.
16. Green J. M: A practical guide to analytical method validation, anal chem. News Feat 305A/309A (May 1, 1996)

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