Research Article
AMERICAN JOURNAL OF PHARMACY AND HEALTH RESEARCH
www.ajphr.com
2014, Volume 2, Issue 10
ISSN: 2321–3647(online)

Development and Validation of RP-HPLC Method for Simultaneous Estimation of Irbesartan and Simvastatin in Tablet Dosage Form

Kumaraswamy Gandla[1]*, R. Suthakaran[1], Pravalika Kondoji[1].
1. Department of Pharmaceutical Analysis, Teegala Ram Reddy College of Pharmacy –Meerpet, Hyderabad- 505172, Telangana.

ABSTRACT

A simple, fast, precise, selective and accurate RP-HPLC method was developed and validated for the simultaneous determination of Irbesartan and Simvastatin from bulk and formulations. The proposed method was developed by HPLC Shimadzu Separation Module with PDA/UV detector connected to Empower software using Inertsil C_{18} ODS (4.6 x 250mm, 5mm) with an injection volume of 20 µl was injected and eluted with a mobile phase composition of Methanol: Acetonitrile (50:50), which is pumped at a flow rate of 0.8ml/min and detected by PDA detector at 245nm. Ambient column temperature has maintained. The total run time was 10mins.The retention time of Irbesartan and Simvastatin were found to be 2.9 min. and 4.1 min respectively. Linearity was observed in the concentration range of 0.2-0.8µg/ml for Irbesartan and Simvastatin respectively with correlation coefficient 0.999 for both the drugs. Percent recoveries obtained for both the drugs were98.0-101.50%, respectively. The method was validated according to the ICH guidelines with respect to specificity, linearity, accuracy, precision and robustness. The method developed can be used for the routine analysis of Irbesartan and Simvastatin from their combined dosage form.

Key words: RP-HPLC Method; Irbesartan and Simvastatin; Tablet dosage forms.

*Corresponding Author Email kumaraswamy.gandla@gmail.com
Received 23 September 2014, Accepted 03 October 2014

Please cite this article as: Gandla K *et al*., Development and Validation of RP-HPLC Method for Simultaneous Estimation of Irbesartan and Simvastatin in Tablet Dosage Form. American Journal of Pharmacy & Health Research 2014.

INTRODUCTION

Irbesartan is an Antihypertensive Agents. The chemical name for Irbesartan is 2-butyl-3-({4-[2-(2H-1,2,3,4-tetrazol-5- yl)phenyl]phenyl}methyl)-1,3-diazaspiro[4.4]non-1-en-4-one, and with a molecular weight of 428.5294. **Simvastatin** is a Hydroxymethyl glutaryl-CoA Reductase Inhibitors. The chemical name for Simvastatin is 1S,3R,7S,8S,8aR)-8-{2-[(2R,4R)-4-hydroxy-6-oxooxan-2-yl]ethyl}-3,7-dimethyl-1,2,3,7,8,8a-hexahydronaphthalen-1-yl-2,2dimethylbutanoate, with a molecular weight of 418.5662. The empirical formula is $C_{25}H_{38}O_5$. The chemical structures of Irbesartan and Simvastatin are shown in Figure 1&2.

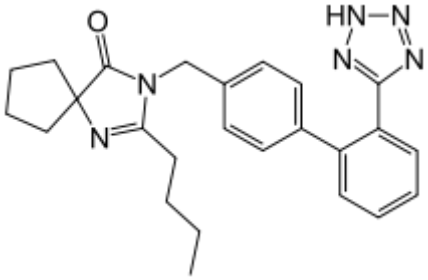

Figure 1: Chemical structure of Irbesartan

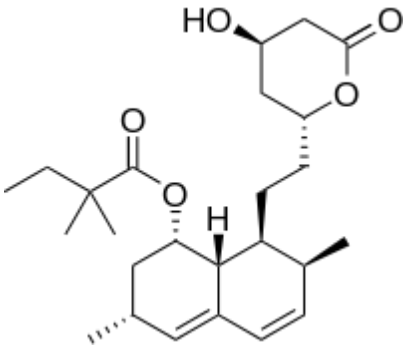

Figure 2: Chemical structure of Simvastatin

MATERIALS AND METHODS

Reagents and chemicals

Methanol HPLC grade was procured from E.Merck Ltd, Mumbai. Methanol, Acetonitrile. Fine chemicals, Hyderabad. Water HPLC grade was prepared using Millipore purification system. Irbesartan and Simvastatin reference standards procured from Active pharma labs, Hyderabad. dihydrogen orthophosphate and phosphoric acid from Rankem Ltd., Mumbai, India, while acetonitrile (HPLC grade) and triethylamine (HPLC grade) from Merck Pharmaceuticals Private Ltd., Mumbai, India. Ortho phosphoric acid used was of HPLC grade and purchased from Merck Specialties Private Ltd., Mumbai, India. Commercially available tablets procured from local market.

Instrument:

Quantitative HPLC was performed on a isocratic high performance liquid chromatograph (Waters-2690 Prominence Liquid Chromatograph) with a LC-20AT VP pump, manual injector with loop volume of 20 µL (Rheodyne), programmable variable wavelength waters PDA detector and Inertsil ODS-3V C18 Column (4.6 X 250mm, 5µm particle size). The HPLC system was equipped with Empower 3000 software. In addition an electronic balance (Shimadzu TX223L), digital pH meter (Systronics model 802), a sonicator (spectra lab, model UCB 40), UV-Visible Spectrophotometer (Systronics model-2203) were used in this study.

HPLC conditions

The contents of the mobile phase were Methanol and Acetonitrile the ratio of 50:50. These were filtered through 0.45µ membrane filter and degassed by sonication before use. The flow rate of mobile phase was optimized to 0.8 ml / min. The run time was set at 8 min and column temperature was maintained at ambient. The volume of injection was 20 µl, and the eluent was detected at 245nm. Each of standard and test preparations was injected into the column and the responses recorded (Fig.03).

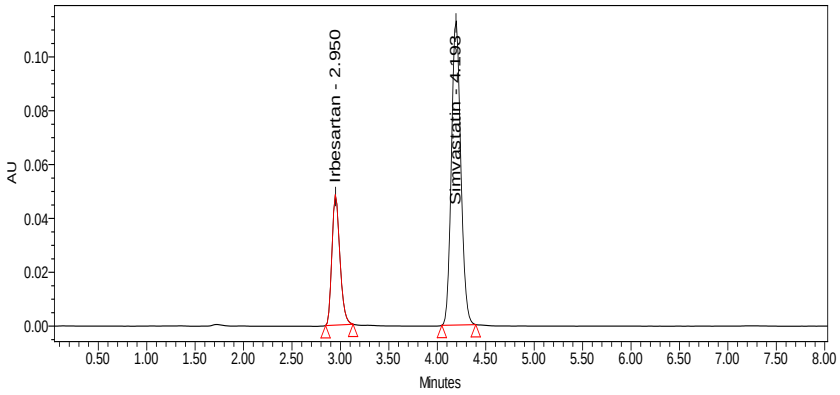

Figure No. 3: Typical chromatogram of Irbesartan and Simvastatin

The RP-HPLC Method of Irbesartan and Simvastatin were achieved by isocratic elution technique with PDA Detector. Irbesartan and Simvastatin were determined at 245nm respectively with the concentration range of 0.20-0.8µg/ml for both Irbesartan and Simvastatin respectively.fig.04 &05. For analysis of tablet formulation the tablet powder equivalent to 25 mg was taken, dissolved in 25 ml volumetric flask and made up to 25ml with Methanol. The solution was sonicated for 15min, centrifuged at 100 rpm for 15 min and filtered through Whatmann filter paper No.41. From clear solution, further dilutions were made to get 10 µg/ml of Irbesartan and Simvastatin theoretically.

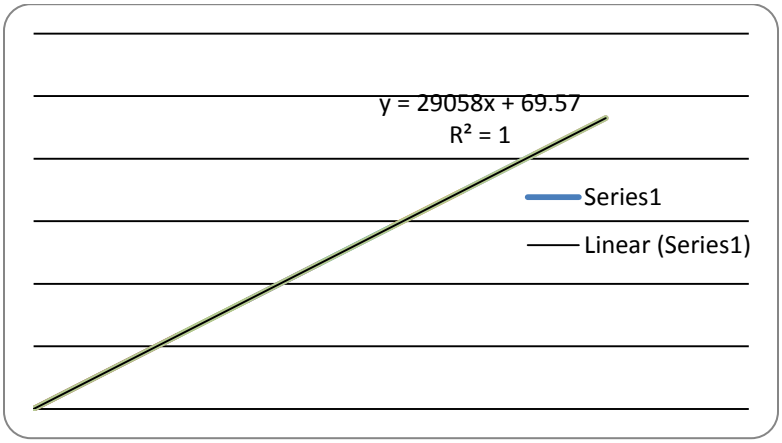

Figure 4: Calibration Graph of Irbesartan

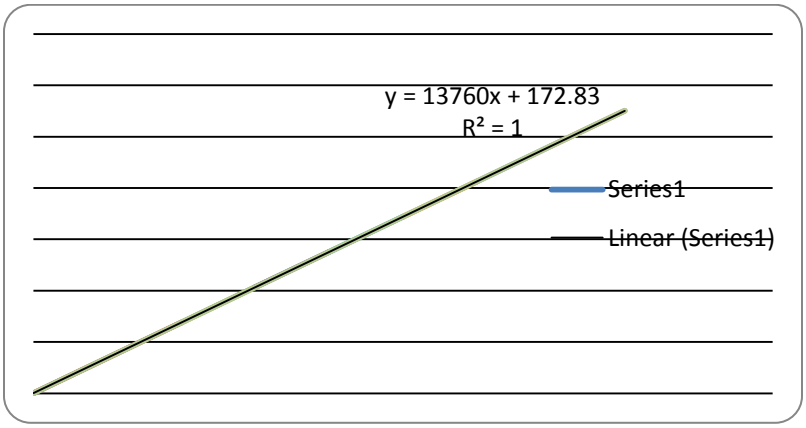

Figure 5: Calibration Graph of Simvastatin

For recovery studies, to the reanalyzed formulation, solutions of raw material containing different concentrations were added and the amount of drug recovered was calculated. The procedure was repeated as per the analysis of formulation. The amount of drug recovered was calculated by using slope and intercept values from the calibration graph. Finally the method was validated as per ICH guide lines for precision, accuracy, specificity, linearity, reproducibility, limit of detection and limit of quantification.

RESULTS AND DISCUSSION

A simple, selective, rapid and precise validated RP-HPLC Method for Simultaneous Estimation of Irbesartan and Simvastatin in bulk material and in pharmaceutical formulation has been developed and validated. The correlation coefficient was found to be 0.9997&0.9998 for Irbesartan and Simvastatin respectively. In this method the % purity of Irbesartan and Simvastatin were found to be 101.25 ± 1.074 and 100.19 ± 1.031 respectively shown in Fig 06. The recovery studies range is.99.98-100.01% and 99.94 – 100.03 % for Irbesartan and Simvastatin, respectively. The Intraday and Inter day analysis carried out for precision. The

ruggedness study was performed. The method % purities were found to be 100.25 ± 1.0054 and 101.49 ± 1.9305 for Irbesartan and Simvastatin, respectively. The recovery studies range is 99.98-100.01% and 99.94 – 100.03 %. Table 1.The Intraday and Inter day analysis carried out for precision. The ruggedness study was performed. The method was validated for statistical analysis

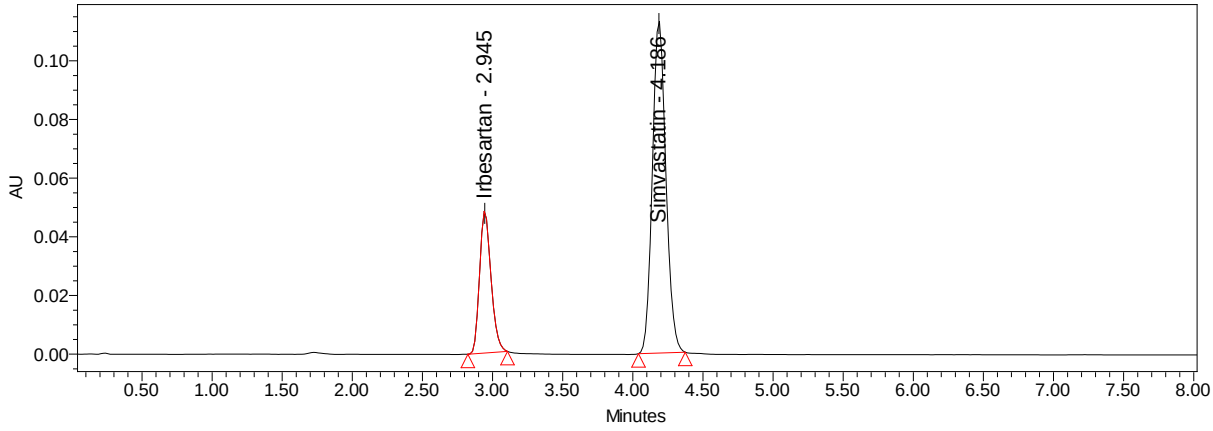

Figure 6: Recovery chromatogram of Irbesartan and Simvastatin

Table 1: Recovery Studies

Drug	Sample No.	Amount present (µg/ml)	Amount added (µg/ml)	% Recovery*	S.D	% R.S.D
IRB	1 2 3	0.2001 0.3998 0.5999	0.2 0.4 0.6	100.01 99.98 99.99	0.64	0.028
SIM	1 2 3	0.1999 0.4003 0.5994	0.2 0.4 0.6	99.95 100.3 99.94	0.30	0.032

CONCLUSION

The results of the validation process showed that the proposed method is authenticated and found within predetermined limits, and fitness for purpose. It can be seen that the proposed procedure has good precision and accuracy. Results of the analysis of pharmaceutical formulations revealed that proposed methods are suitable for their analysis with virtually no interference of the usual additives present in the pharmaceutical formulations.The developed RP-HPLC method was validated and the statistical validation was performed with the simplicity and ease of operation ensures that the validated method can successfully used for routine Analysis of Irbesartan and Simvastatin in bulk and tablet dosage formulation.

ACKNOWLEDGEMENTS:

The authors would like to thank MS.ACTIVE PHARMA LABS, for providing the gift samples of Irbesartan and Simvastatin for the project work.They also thank chairman Mr.T.Neetish Reddy.TRR Pharmacy College, and Dr.R.Suthakaran, Principal of TRR College of Pharmacy for providing necessary facilities to carry out this research work.

REFERENCE:

1. H. M. Colhoun, D.J. Betteridge, P.N. Durrington . The Lancet, 2004,364, 685-96 .
2. G G Alfred, S G Louis, et.al., Goodman and Oilman's, McGraw Hill, 1996. 904.
3. K. L. Gould., S.W. Casscells, L.M. Buja, D.C. Goff. The Lancet, 1995 346, 750-753.
4. N.W. ShinichiroHiroshi, K. Kazuhiro, U. Shinya, H. Hideharu, O. Kyoichi, Hypertension Res. 2005,28, 223-227.
5. A. K. Robert and O. Albert J.et.al., Clin. Endocrinol. Metab., 2002,87(2), 423-437.
6. H Tajerzadeh, M Hamidi, J Pharm Biomed Anal 2001,4,675-680.
7. K. H. Yoon, W. Kim et.al Bulletin of the Korean Chemical Society 6: 2004,878-880.
8. V.V. Pisarev1, N.E. Moskaleva1, Y.B. Zverkov1, L.B. Smirnova1, V.G. Belolipetskaya and Y.V. Sukhanov. Pharmaceutical Chemistry Journal, 2, 104-107, (2005).
9. M.P. Khalid, M. Muzeeb, et al., "Analysis of five HMG-CoA reductase inhibitors - atorvastatin, lovastatin, pravastatin, rosuvastatin and simvastatin: pharmacological, pharmacokinetic and analytical overview and development of a new method for use in pharmaceutical formulations analysis and in vitro metabolism studies". Biomedical Chromatography, 2005,20 (3), 282 - 293.
10. V. Shivva R. S Nikhil, et al., "Simultaneous quantitation of rosuvastatin and gemfibrozil inhuman plasma by high-performance liquid chromatography and its application to a pharmacokinetic study". Biomed. Chromatography 20(11):1252-9, (2006).
11. Thammera R. K., Nikhil R. et al., "Determination of rosuvastatin in rat plasma by HPLC: validation and its application to pharmacokinetic studies". Biomed. Chromatogr.,20(9),881-887,(2006).
12. N. Sultana N, M.S. Arayne et al., Simultaneous Determination of Olmesartan Medoxamil and Irbesartan and Hydrochlorothiazide in Pharmaceutical Formulations and Human Serum using High Performance Liquid Chromatography Chinese Journal of Chromatography 2008,26(5), 554-559.
13. N. Sultana N, M.S. et al., “Simultaneous determination of atenolol, rosuvastatin, spirono-

lactone, glibenclamide and naproxen sodium in pharmaceutical formulations and human plasma by RP-HPLC Journal of the Chinese Chemical Society. 2008, 55(5), 1022-1029.

14. N. Sultana N, M.S. et al.,"An RP-HPLC method for simultaneous analysis of, and interaction studies on, enalapril maleate and H^2-receptor antagonists. Acta Chromatographica 2009,21 (4), 547-558.
15. N. Sultana N, M.S. Arayne, et al., A Development of a RPHPLC method for the simultaneous analysis of diltiazem and statin: Application in pharmaceuticals and human serum Anal. Methods, 2, 2010,1571-1576.
16. N. Sultana N, M.S. Arayne .et al., " Validated method for the simultaneous determination of lisinopril, pravastatin, atorvastatin and rosuvastatin in API, formulations and human serum by RP-HPLC Chinese Journal of Chemistry 2011 ,29, 2421—2427.
17. N. Sultana N, M.S. Arayne .et al., "Simultaneous determination of prazosine, atorvastatin, rosuvastatin and simvastatin in API dosage formulations and human serum by RP-HPLC. J Chinese Chemical Society 2010, 57(6), 1286-92.
18. N. Sultana N, M.S. Arayne. et al., Simultaneous Determination of Ceftrioxazone sodium and Statin Drugs in Pharmaceutical Forms and Human Serum by RP-HPLC. Journal of The Chilean Chemical Society, 2010, 55,(2), 193-198.
19. N. Sultana N, M.S. Arayne, et al., "High-performance liquid chromatographic analysis of pioglitazone, gliquidone, rosuvastatin and simvastatin in formulations and human serum Chin. J. Chem, 1998-2002,28(10).
20. R.I. Snyder, J.J. Kirkland, et al., Practical HPLC Method development, Published By John Wiley and Son, Inc, New York, 2ndEdn., 1997, pp.21-57.
21. Code Q2A and Q2B, Text on Validation of Analytical Procedures. ICH Harmonized Triplicate Guidelines, Geneva, Switzerland, and 27 October 1994, 1-8.
22. http://www.ich.org (ICH website)