INTERNATIONAL JOURNAL OF PHARMACY AND ANALYTICAL RESEARCH

ISSN:2320-2831

IJPAR |Vol.7 | Issue 2 | Apr - Jun -2018
Journal Home page: www.ijpar.com

Research article *Open Access*

Reverse phase-high performance liquid chromatography method estimation of levocetirizine and montelukast in tablet dosage forms

Mala Swapna[1*], Srikanth Choudary Pallothu[2]

[1]*M.Pharmacy, (PAQA) IV Semester, Omega College of Pharmacy, Edulabad, Hyderabad, Ghatkesar, Telangana 501301*

[2]*Associate Professor, Omega College of Pharmacy, Edulabad, Hyderabad, Ghatkesar, Telangana 501301.*

***Corresponding Author: Mala Swapna**
Email: swapnamala94@gmail.com

ABSTRACT

In the current study a simple, accurate and precise reverse phase liquid chromatographic method has been developed for simultaneous estimation of Levocetirizine Hydrochloride and Montelukast Sodium from tablet dosage form. The method was developed using HPLC series Compact System Consisting of Inertsil-C18 ODS column, using a mixture of 0.05 (M) Potassium Dihydrogen Phosphate Buffer and Methanol : buffer (80:20) as mobile phase in an isocratic elution mode at a flow rate of 1.0 ml/min, at 30ºC with a load of 10µl. The detection was carried out at 225 nm. The retention time of Levocetirizine and Montelukast were found to be around 2.8 min and 43.9 min respectively. The method was validated with respect to linearity, robustness, precision and accuracy and was successfully applied for the simultaneous quantitative determination of Levocetirizine Hydrochloride and Montelukast Sodium from the tablets.

Keywords: Levocetirizine Hydrochloride, Montelukast Sodium, RP-HPLC, Tablets.

INTRODUCTION

The Levocetirizine dihydrochloride is chemically (RS)-2-{4-[(R)-p-chloro-á-phenylbenzyl]-1-piperazinyl} ethoxyacetic acid dihydrochloride. Its molecular formula is $C_{21}H_{25}C_2lN_2O_3$. 2HCl. The recommended dose of 21 25 2 2 3Levocetirizine is 5mg per day. Levocetirizine (as levocetirizine 2HCl) is a third generation non-sedative antihistamine, acts by blocking histamine receptors. It is used in the treatment of several allergic reactions, viz., allergic rhinitis, idiopathic urticaria, hay fever etc. HPLC method of analysis for Levocetirizine Hydrochloride in bulk as well as from tablet is available. Montelukast is a specific cysteinyl leukotriene receptor antagonist belongs to a styryl quinolines series with the chemical name 2-[1-[1(R)-[3-[2(E)-(7-chloroquinolin-2-yl)vinyl]phenyl]-3[2-(1-hydroxy-1-methylethyl)phenyl]propyl sulfanyl methyl] cyclo-propyl] acetic acid. Its molecular formula is

$C_{35}H_{36}ClNO_3S$. The recommended dose of Montelukast is 10mg per day. It is developed as a therapeutic agent for the treatment of bronchial asthma and exercise induced bronchospasm. It has been that various methods have been reported for analysis of Levocetirizine dihydrochloride and montelukast sodium in single component formulations but a less number of methods are available for the simultaneous estimation of these two drugs in multicomponent dosage forms [1-8].

MATERIALS AND METHODS

Chemicals and reagents

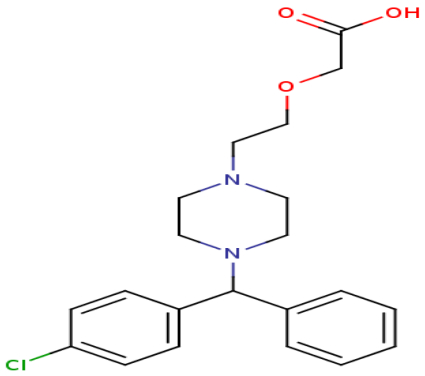

Figure 1: Structure of Levocetirizine dihydrochloride

Chemical Formula : $C_{21}H_{25}ClN_2O_3$
Molecular Weight : 388.888 g/mole

IUPAC:2-(2-{4-[(4-chlorophenyl)(phenyl)methyl]piperazin-1-yl}ethoxy)acetic acid.

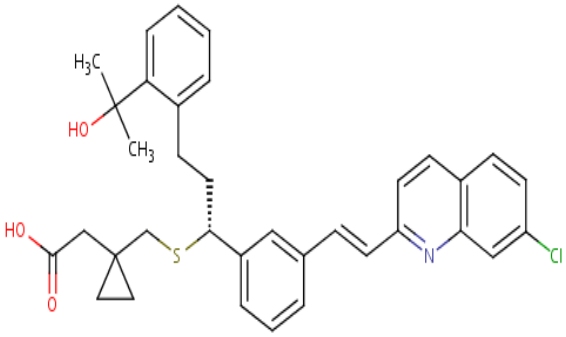

Figure 2: Structure of montelukast sodium

Chemical formula : $C_{35}H_{36}ClNO_3S$
Molecular Weight : 586.183 g/mole
IUPAC :2-[1-({[(1R)-1-{3-[(E)-2-(7-chloroquinolin-2-yl)ethenyl]phenyl}-3-[2-(2-hydroxypropan-2-yl)phenyl]propyl]sulfanyl}methyl)cyclopropyl]acetic acid

Instrumentation

The HPLC –Waters Model NO.2690/5 series Compact System Consisting of Inertsil-C18 ODS column, Electronic balance (SARTORIOUS), Sonicator (FAST CLEAN), vacuum degasser, rheodyne injector with a 20µl loop, UV-Visible detector and C-8 column [9-11].

Chromatographic conditions

The isocratic mobile phase consisting of methanol– potassium dihydrogen phosphate buffer Methanol: Water (80:20), pH 3.5 ± 0.02, adjusted with orthophosphoric acid) was used at a flow rate of 1.0 ml/min. The variable wavelength UV–visible detector was set at 225 nm. All analyses were performed at ambient temperature.

Preparation of (KH_2PO_4 0.1M) buffer

Weight 3.8954g of di-sodium hydrogen phosphate and 3.4023 of potassium dihydrogen phosphate in to a beaker containing 1000ml of distilled water and dissolve completely. Then ph is adjusted with orthophosphoric acid and then filtered through 0.45µm membrane filter.

Preparation of stock solution

The solution was prepared by dissolving 20.0 mg of accurately weighed Levocetirizine and 25.0 mg Montelukast in Mobile phase, in two 100.0 mL volumetric flasks separately and sonicate for 20min. From the above solutions take 10.0 mL from each solution into a 50.0 mL volumetric flask and then makeup with mobile phase and sonicate for 10min.

Preparation of working standard solution

The stock solutions equivalent to 20ppm to 80ppm with respect to both drugs were prepared in combination of Levocetirizine and Montelukast above, sonicated and filtered through 0.45µ membrane.

Preparation of sample drug solution for pharmaceutical formulations

Twenty tablets were weighed accurately and a quantity of tablet powder equivalent to 20 mg Levocetirizine and 40 mg Montelukast was weighed and dissolved in the 70 mL mobile phase with the aid of ultrasonication for 20 min. The content was diluted to 100 mL with mobile phase to furnish a stock test solution. The stock solution was filtered through a 0.45 µm Nylon syringe filter and 10.0 mL of the filtrate was diluted into a 50.0 mL volumetric flask to give a test solution containing 20 µg/mL Levocetirizine and 40 µg/mL Montelukast.

Linearity of Test Method

A Series of solutions are prepared using Levocetirizine dihydrochloride and montelukast sodium working standards at concentration levels from 25ppm to 150 ppm of target concentration .Measure the peak area response of solution at Level 1 and Level 6 six times and Level 2 to Level 5 two times [12].

Specificity

Levocetirizine dihydrochloride and montelukast sodium

Solutions of standard and sample were prepared as per the test method are injected into chromatographic system.

Precision

Repeatability

System precision: Standard solution prepared as per test method and injected five times. Method precision: Prepared six sample preparations individually using single as per test method and injected each solution.

Accuracy (Recovery)

A study of Accuracy was conducted. Drug Assay was performed in triplicate as per test method with equivalent amount of Levocetirizine dihydrochloride and montelukast sodium into each volumetric flask for each spike level to get the concentration of Levocetirizine dihydrochloride and montelukast sodium equivalent to 50%, 100%, and 150% of the labeled amount as per the test method [12, 13]. The average % recovery of Levocetirizine dihydrochloride and montelukast sodium was calculated.

Limit of Detection and Quantitation (LOD and LOQ)

From the linearity data calculate the limit of detection and quantization, using the following formula.

$$LOD = \frac{3.3\ \sigma}{S}$$

σ = standard deviation of the response

S = slope of the calibration curve of the analyte.

$$LOQ = \frac{10\ \sigma}{S}$$

σ = standard deviation of the response

S = slope of the calibration curve of the analyte [13-16].

RESULTS AND DISCUSSION

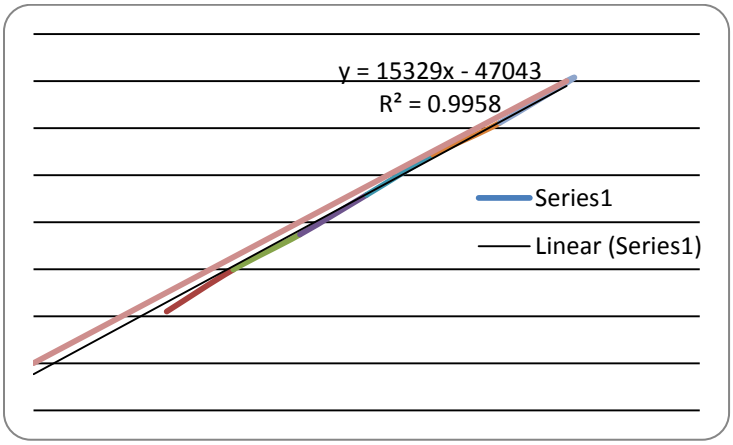

Figure 3: Linearity Plot (Concentration Vs Response) of Levocetirizine

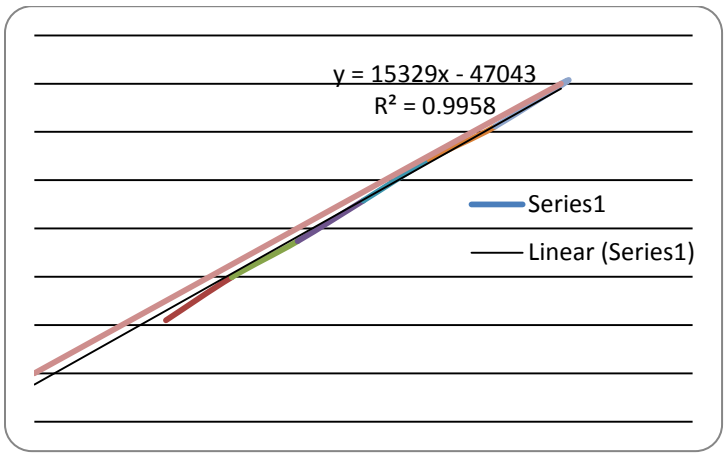

Figure 4: Linearity Plot (Concentration Vs Response) of Montelukast

Table 1: Analysis report

S.No	Drug	RSD (%)	% Assay
1	Levocetirizine dihydrochloride (LV)	0.81	99.48
2	Montelukast sodium (MS)	0.43	99.71

Table 2: Percentage recovery data

Drug	Percentage simulated dosage nominal	% Mean (n=6)	% RSD
LV	50	99.81	0.55
MS	50	99.90	0.20
LV	100	100.35	0.42
MS	100	99.90	0.23
LV	150	100.15	0.17
MS	150	99.3	0.10

System suitability data

System Suitability Parameters

For system suitability parameters, six replicate injections of mixed standard solution were injected and parameters such as the Retention time, tailing factor.

Table 3: System suitability data

Parameters	Levocetirizine dihydrochloride (LV)	Montelukast sodium (MS)
Tailing factor	0.4832705	1.089051
Retention time	2.869	3.942

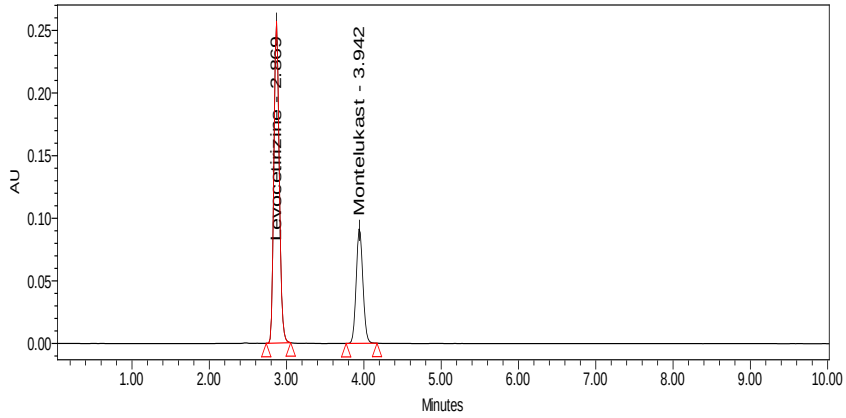

Figure 5: Chromatogram of standard

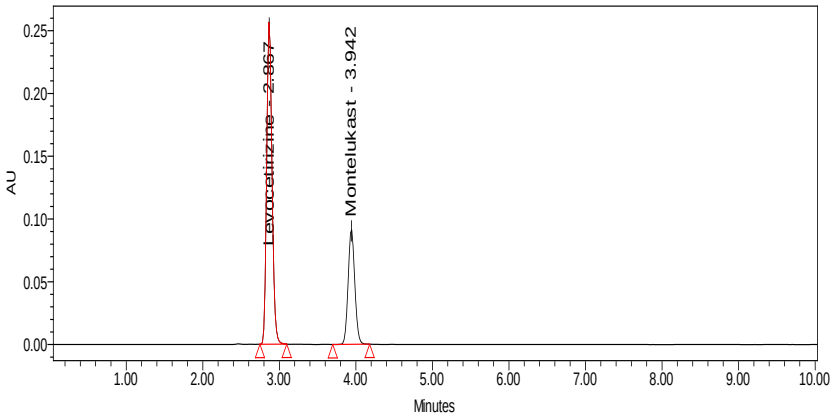

Figure 6:Chromatogram of sample

CONCLUSION

Proposed study describes an RP-HPLC method for the estimation of LV and MS combination. The method has been found to be better than previously reported method, because of use of an economical and readily available mobile phase and UV detection. The method gives good resolution for both the drugs with a short analysis time. The method was validated and found to be simple, sensitive, accurate and precise. Percentage recovery shows that the method is free from interference.

REFERENCES

[1]. Singh RM, Saini PK, Mathur SC, Singh GN, Lal B, Development and Validation of a RP-HPLC Method for Estimation of Montelukast Sodium in Bulk and in Tablet Dosage Form, Indian J Pharm Sci, 72(2), 2010, 235-237

[2]. Sharma S, Sharma MC, Kohli DV, Sharma AD, Development and Validation of TLC-Densitometry Method for Simultaneous Quantification of Montelukast Sodium and Levocetirizine Dihydrochloride Pharmaceutical Solid dosage form. Der Pharmacia Lettre, 2(1), 2010, 489-94

[3]. Rathore AS, Sathinarayana L, Mahadik KR, Development of Validated HPLC and HPTLC Methods for Simultaneous Determination of Levocetirizine dihydrochloride and Montelukast sodium in Bulk Drug and Pharmaceutical Dosage Form. Pharma Anal Acta, An Open Access Journal, 1(1) 2010, 1-6

[4]. Sankar ASK, Baskar GN, Nagavalli D, Anandakumar K, Vetrichelvan T, Simultaneous Estimation of Montelukast Sodium and Levocetirizine Hydrochloride from Tablet Dosage Form. Res J Phar and Tech, 2(4), 2009, 443-445

[5]. Choudhari V, Kale A, Abnawe S, Gwale V, Simultaneous Determination of Montelukast Sodium and Levocetirizine Dihydrochloride in Pharmaceutical Preparations by Ratio Derivative Spectroscopy, Inter J Pharma Tech Res, 2(1), 2010, 4-9.

[6]. Ashokkumar S, Senthil Raja M, Perumal P, RP-HPLC Method Development and Validation for Simultaneous Estimation of Montelukast Sodium and Levocetirizine Dihydrochloride, Inter J Pharm Res, 1 (4), 2009, 8-12.

[7]. Alsarra I.Development of a stability-indicating HPLC method for the determination of Montelukast in tablets and human plasma and its applications to pharmacokinetic and stability studies. Saudi Pharm J. 12, 2004, 136–43.

[8]. A.F.M. El Walily, et al.Spectrophotometric and high performance liquid chromatographic determination of cetirizine dihydrochloride in pharmaceutical tablets J.Pharmaceut. Biomed. Anal. 17, 1998, 435–442.

[9]. Sevgi K., et al. Development and validation of a rapid RP-HPLC method for the determination of cetirizine or fexofenadine with pseudoephedrine in binary pharmaceutical dosage forms. J.Pharmaceut.Biomed.Anal. 46, 2008, 295-302

[10]. Sun Ok Choi., et al.Stereoselective determination of cetirizine and studies on pharmacokinetics in rat plasma.Journal of Chromatography B. 2000, 744: 201–206. Mee-Kyung Kima., et al. Narrow-bore high performance liquid chromatographic method for the determination of cetirizine in human plasma using column switching. J.Pharmaceut.Biomed.Anal. 37, 2005, 603–609

[11]. Jabera A.M.Y., et al. Determination of cetirizine dihydrochloride, related impurities and preservatives in oral solution and tablet dosage forms using HPLC. J.Pharmaceut.Biomed.Anal. 36, 2004, 341–350

[12]. Raghad Hommos., et al. Determination of Levocetirizine configurational stability in tablets using chiral HPLC method.IJPPS, 3(2), 2011, 103-07

[13]. Melanie M.T., et al. Automated 96-well solid phase extraction and hydrophilic interaction liquid chromatography–tandem mass spectrometric method for the analysis of cetirizine in human plasma—with emphasis on method ruggedness.Journal of Chromatography B, 814, 2005, 105–11

[14]. Mortia M.R, et al. Determination of Levocetirizine in human plasma by liquid chromatography–electrospray tandem mass spectrometry: Application to a bioequivalence study.Journal of chromatography B. 862, 2008, 132-139

[15]. Sharma Smita, Sharma M. C, Kohli D.V, Sharma A.D.Development and Validation of TLC Densitometry Method for Simultaneous quantification of Montelukast Sodium and Levocetirizine dihydrochloride Pharmaceutical Solid Dosage Form,Scholars Research Library, Der Pharmacia Lettre, 2(1), 2010, 489-494.

[16]. Choudhari V, Kale A, Abnawe S , Kuchekar B , Gawli V ,Patil N.Simultaneous Determination of Montelukast Sodium and Levocetirizine dihydrochloride in Pharmaceutical Preparations by Ratio Derivative Spectroscopy. IJPRIF, 2(1), 2010, 04-09.