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Research Article

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A Novel validated stability indicating Chromatographic method for the Simultaneous estimation of Levocetrizine and Montelukast in the combined dosage form by RP-HPLC

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ABSTRACT

The objective of the current study was to develop and validate a rapid, precise, specific reverse phase HPLC for the quantitative determination of Levocetrizine and Montelukast in its dosage form. The determination is done for the active pharmaceutical ingredient in its pharmaceutical dosage form. The dosage was subjected to analytical studies as per international conference on harmonization (ICH) prescribed. It was found Levocetrizine and Montelukast is very sensitive to different conditions. The chromatographic conditions were optimized using the samples. Regression analysis shows an r value (correlation coefficient) 0.998 and 0.999 respectively for Levocetrizine and Montelukast .The chromatographic separation was achieved on a Symmetry C18 (4.6 x 150mm, 3.5µm, Make: XTerra) or equivalent. The method employed an isocratic elution and the detection wave-length was set at 232 nm. The mobile phases consists of methnol : buffer (Ph 3.8) delivered at a flow rate of 1.0 mL/•min. The developed RP-LC method was validated with respect to linearity, accuracy, precision and robustness.

Key words: Levocetrizine, Montelukast, HPLC, Accuracy, Precision, RP-LC method

Introduction

ADMONT-LC is a fixed dose combination of two Anti asthmatic and anti allergic drugs Montelukast (10mg), Levocetrizine (5mg), used to treat asthmatic patients. This is a combination where administration convenience and better compliance are put together .A dosage with combination is always better than single dosage in terms of cost and patient compliance. Foreseeing the need of different analytical methods for the estimation of ingredients of the ADMONT-LC, the ultimate goal of the work was to develop a validated HPLC method selective for the two main components of the tablet ADMONT-LC . Developing a single method for the combination is tough and challenging task due to formation of drug-drug and drug-excipients interactions. Extensive literature survey did not reveal any simple, sensitive analytical method for the simultaneous determination of both the two drugs in ADMONT-LC. Here is an attempt to develop new, sensitive HPLC method for simultaneous quantitative determination of Montelukast and Levocetrizine. Levocetrizine with CAS no.130018-77-8[1] and chemically 2-(2-{4-[(*R*)-(4-chlorophenyl) (phenyl) Methyl] piperazin-1-yl}ethoxy)acetic acid[2].

Montelukast with CAS no.151767-02-1[3],chemically(R,E)-2-(1-((1-(3-(2-(7-chloroquinolin-2-yl)vinyl)phenyl)-3-(2-(2-hydroxypropan-2-yl)phenyl)propylthio)methyl)cyclopropyl)aceticacid[4],A simple, accurate, economical and reproducible reverse phase high performance liquid chromatographic (RP-HPLC) method was developed and validated for the determination of Montelukast sodium and fexofenadine hydrochloride in bulk and pharmaceutical formulations and another[5] another simple, accurate, rapid and precise isocratic reversed-phase high-performance liquid chromatographic method has been developed and validated for simultaneous determination of Levocetrizine and Montelukast sodium in tablets.[6] A similar Has developed a multiple response simultaneous optimization using the Derringer's desirabilityfunction for the development of a reversed-phase HPLC methods for the simultaneous determination of Ambroxol(AMB) and Montelukast(MLS) with Levocetrizine (LCT) in commercial pharmaceutical preparations.[7] Another validated simple and precise HPLC method was developed for estimation of Montelukast sodium (MTKT) and Levocetrizine dihydrochloride (LCTZ) in pure and pharmaceutical dosage form.[8], and another developed a stability-indicating HPTLC method for Montelukast sodium (MTKT) and Levocetrizine di hydrochloride (LCTZ) in the presence of its degradation products generated from forced decomposition studies.[9] a simple has described for the simultaneous determination of Levocetrizine dihydrochloride and Montelukast sodium in tablets.

The first method was a high performance thin layer chromatographic-HPTLC separation followed by diensitometric measurements on normal phase silica gel 60 F254.[10] There was another method stated that the present study a simple, accurate and precise reverse phase liquid chromatographic method has been developed for simultaneous estimation of Levocetrizine Hydrochloride and Montelukast Sodium from tablet dosage form.[11]. Another such A reverse phase high performance liquid chromatography method has been developed for the simultaneous estimation of Levocetrizine hydrochloride and Montelukast sodium in tablet formulation.[12].The method reported was a stability indicating method for Levocetrizine and Montelukast combination which was not official. Along with this assay method was also reported.

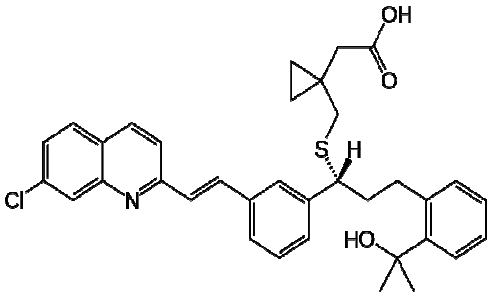


Fig no.1 Structure of Montelukast

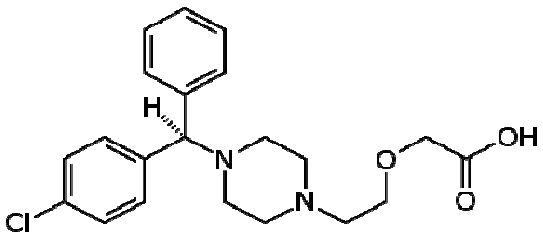


Fig.no.2 Structure of Levocetrizine

Materials and Methods

Instrumentation:

Waters LC system equipped with 2695 pump and 2996 photodiode array detector was used. The output signals were monitored and integrated using waters Empower 2.0software. Analytical balance (Model: AB 204S, Make: Mettle Toledo) and Micro balance (Model: XP 6, Make: Mettle Toledo) were used for weighing. Systronics digital pH meter 361 was used to adjust the pH of the buffer. Degassing of the mobile phase was done by sonication using spinco Biotech ultra sonicator) Filtration was done by using millipore vaccum filter. Drugs and chemicals: Pure standards of Levocetrizine and Montelukast standards were kindly gifted from Hetero drugs Ltd., Hyderabad, India. The HPLC grade methanol, dipotassium hydrogen phosphate, ortho phosphoric acid were purchased from Merck.

Preparation of Solutions

Preparations of buffer:

Weighed about 1.7gms of dipotassium hydrogen phosphate into a 1000ml beaker and dissolved and diluted to 1000ml with milli-Q water. Adjusted the pH to 3.8 with Ortho phosphoric acid. And filtered through 0.45 µm membrane filter.

Preparation of Mobile phase:

Buffer and methanol were mixed in the ratio 70:30 v/v and sonicated for 10 minutes

Preparation of diluent:

Mobile phase is used as diluent

Preparation of Solutions for Peak Identification

Preparation of Levocetrizine standard solution for peak identification:

Weighed accurately 25 mg of Levocetrizine standard into a 50mL volumetric flask and added about 10mL of diluent, sonicated for 10 minutes to dissolve and diluted upto the mark with diluent. Further diluted 5.0ml of the above solution to 50ml

Preparation of Montelukast standard solution for peak identification:

Weighed accurately 50mg of Montelukast standard into a 50mL volumetric flask and added about 10mL of diluent, sonicated for 10 minutes to dissolve and diluted upto the mark with diluent. Further diluted 5.0ml of the above solution to 50ml

Preparation of standard solution:

Accurately weighed and transferred 25 mg of Levocetrizine and 50mg of Montelukast working standards into a 50ml clean dry volumetric flask, added about 30ml of diluent and sonicated to dissolve it completely and made volume up to the mark with the same diluent. Further diluted 5.0ml of the above solution to 50ml

Preparation of placebo solution:

Weighed accurately 92.1mg of placebo powder into 50mL volumetric flask, added 30ml of the diluent and sonicated for 20min and diluted to the volume with diluent. Further diluted 5.0ml of the above solution to 50ml

Test preparation:

Accurately weighed and finely powdered 20 tablets of **ADMONT-LC** and transferred an amount of the powder equivalent to 25mg of Levocetrizine into a 100ml of volumetric flask, added 30ml of the diluent and sonicated for 20min and diluted to the volume with diluent. Further diluted 5.0ml of the above solution to 50ml

Optimized chromatographic conditions:

After systematic and detailed study of the various parameters involved in the method, the following conditions were employed.

Column : Symmetry C18 (4.6 x 150mm, 3.5µm, Make: XTerra) or equivalent
Flow rate : 1.0 ml per min
Wavelength : 232 nm
Injection volume: 20 µL
Column oven Temperature: 30°c
Run time: 10min.

Procedure:

Column was equilibrated for at least 60 minutes with the mobile phase flowing through the system at a rate of 1.0mL/min. Detector was set at a wavelength of 232nm. Separately injected 20µL of diluent, placebo, peak identification solutions, standard solution, test solutions into the chromatograph and the chromatograms were recorded. The percent assay values of Levocetrizine and Montelukast were calculated by using the following formulae.

% Assay:

$$\frac{IA}{SA} \times \frac{WS}{200} \times \frac{100}{WT} \times \frac{P}{100} \times 100$$

Where IA = peak area of the sample preparation
SA = Peak area of the standard preparation
WS= Weight of the standard
WT=Weight of the sample
P = potency of the standard

Analytical method Validation

System suitability:

According to the USP 33 System suitability is the integral part of the chromatographic method. This test was conducted to verify that the reproducibility and effectiveness of the system is adequate for the analysis.
To ascertain its effectiveness 20µL of freshly prepared standard solution containing 50µg/mL of Levocetrizine and, 100µg/mL Montelukast was injected 6 times into the HPLC system by using optimized chromatographic conditions and System suitability results were calculated.
The %RSD for the peak areas and retention times of both the drugs were found to be less than 2.0%. The theoretical plates were more than 2000 for both the drugs. Tailing factor was found to be less than 2.0. The resolution between the adjacent peaks was found to be more than 6.0.
All the results were tabulated in the table no's. 1 & 2

Table no.1. System suitability of Montelukast

S.no	Retention time	Peak area	Theoretical plates	Tailing
1	2.012	1552838	5126	1.02
2	2.016	1547891	5214	1.02
3	2.018	1565810	5148	1.02
4	2.022	1548971	5140	1.02
5	2.026	1536987	5149	1.02
6	2.025	1524569	5129	1.02
7	2.010	1548754	5138	1.03
8	2.016	1564854	5125	1.01
9	2.019	1526841	5124	1.02
10	2.011	1532154	5121	1..03
Average	2.0	1544967		
SD	0.0056	14542.2		
%RSD	0.3	0.9		

Table no.2. System suitability of Levocetrizine

S.no	Retention time	Peak area	Theoretical plates	Tailing	Resolution
1	3.612	1014128	5412	1.08	5.21
2	3.601	1001568	5422	1.08	5.21
3	3.598	1002568	5526	1.08	5.21
4	3.589	1024568	5014	1.08	5.21
5	3.612	1015897	5224	1.08	5.21
6	3.614	1025468	5246	1.08	5.21
7	3.607	1001695	5316	1.07	5.2
8	3.591	1013829	5226	1.09	5.19
9	3.597	1015798	5219	1.06	5.22
10	3.603	1001613	5230	1.08	5.21
AVARAGE	3.602	1011713			
SD	0.009	9356.4			
%RSD	0.245	0.9			

Specificity:

Blank and placebo interference:

A study to establish the interference of blank and placebo was conducted. Analysis was performed on placebo preparation described previously in triplicate equivalent to about the weight of placebo in portion of test preparation as per test method. Chromatograms of Blank and placebo solutions shown no peaks at the retention times of levocetrizine and montelukast. This indicates that the excipients used in the formulation did not interfere in the estimation. The chromatograms of blank and placebo using the proposed method were shown in figure 3 & 4.

Fig no 3. Representative Model Chromatogram of Blank solution

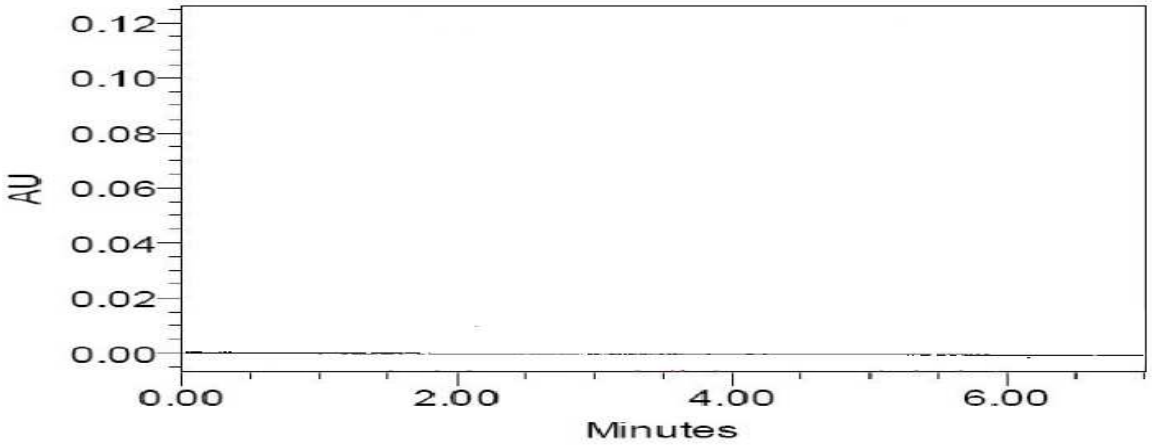


Fig no. 4. Representative Model Chromatogram of placebo

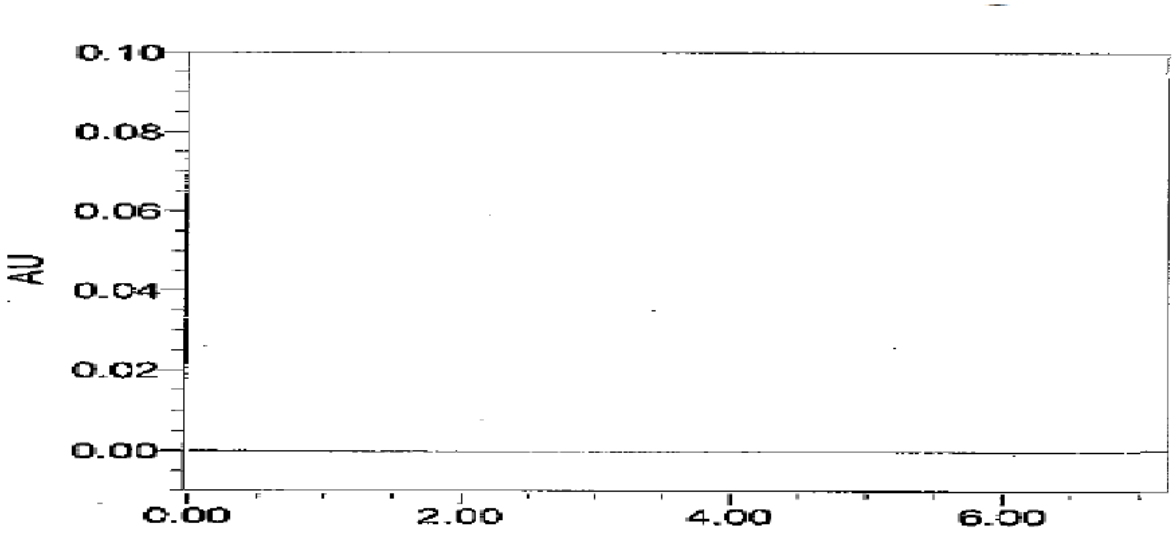


Fig no.5. Representative Model Chromatogram of standard solution

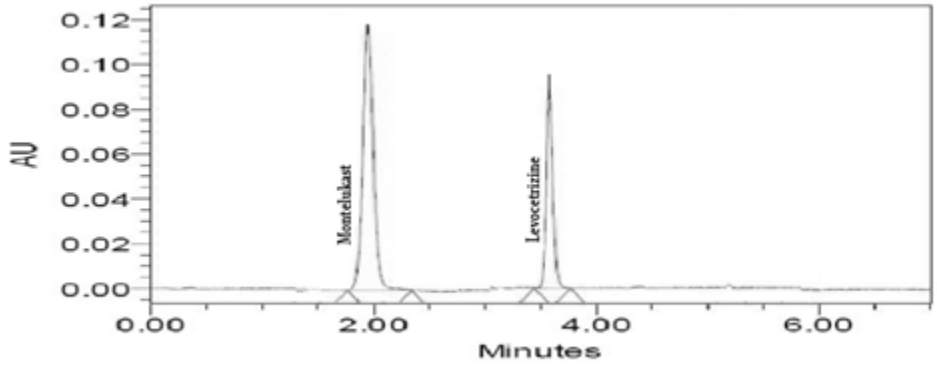
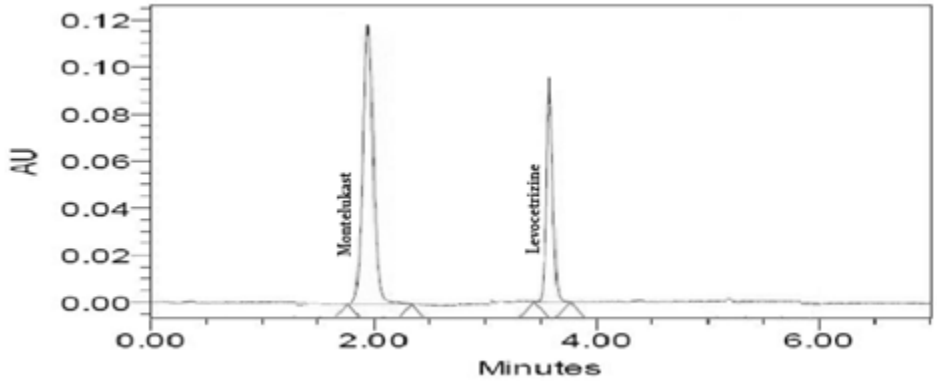


Fig no .6. Representative chromatogram of Sample solution



Interference from Degradation Products
Preparation of degradation samples:
Preparation of sample for Acid degradation:
ADMONT-LC sample was refluxed with the 1M HCl at 60°C for 1hour and then neutralized with 1N NaOH. The sample was prepared as per the test method and then further diluted upto the required concentration with the diluent.

Preparation of sample for Alkaline degradation:
ADMONT-LC sample was refluxed with the 1M NaOH. at 60°C for 1hour and then neutralized with 1M HCl The sample was prepared as per the test method and then further diluted upto the required concentration with the diluent.

Preparation of sample for Oxidative degradation:
ADMONT-LC sample was refluxed with the 10%H_2O_2 by heating on water bath at 60°C for 1 hour. The sample was prepared as per the test method and then further diluted upto the required concentration with the diluent.

Preparation of sample for Photolytic degradation:
ADMONT-LC sample was exposed to UV (200watt-hr/m^2) and visible (1.2 million lux hrs) The sample was prepared as per the test method and then further diluted upto the required concentration with the diluent.

Preparation of sample for Thermal degradation:
ADMONT-LC sample was exposed to temperature at 105°c for 24hrs . The sample was prepared as per the test method and then further diluted upto the required concentration with the diluent.

Preparation of sample for Humidity degradation:
ADMONT-LC sample was exposed to 85% humidity for 24hrs .The sample was prepared as per the test method and then further diluted up to the required concentration with the diluent.
All the stressed samples were injected into the HPLC system by using optimized chromatographic conditions and the chromatographs were recorded. The chromatograms of the stressed samples were evaluated for peak purity of both the drugs using PDA detector and Empower software. In all forced degradation samples both the drugs passed the peak purity (purity angle is less than purity threshold). All the degradant peaks were well separated from both the drugs. Thus the method can be used for simultaneous estimation of Levocetrizine and Montelukast in bulk and pharmaceutical formulations and also the method is stability indicating.
The results are given in the table no.3 &.4

Table No: .3. Degradation Table for Montelukast

STRESS CONDITION	PURITY ANGLE	PURITY THRESHOLD	% ASSAY	DEGRADATION
Acid degradation	0.11	0.16	92.4	7.2
Alkali degradation	0.19	0.22	93.5	6.1
Thermal degradation	0.28	0.32	89.2	10.4
Humidity degradation	0.16	0.21	91.7	7.9
Photolytic degradation	0.18	0.24	98.4	1.2
Peroxide degradation	0.24	0.31	90.7	8.9

Table no .4. Degradation Table for Levocetrizine

STRESS CONDITION	PURITY ANGLE	PURITY THRESHOLD	% ASSAY	DEGRADATION
Acid degradation	0.13	0.17	92.4	7.8
Alkali degradation	0.19	0.23	93.2	7.0
Thermal degradation	0.28	0.33	91.2	9.0
Humidity degradation	0.14	0.19	92.4	7.8
Photolytic degradation	0.16	0.21	91.7	8.5
Peroxide degradation	0.19	0.26	92.2	8.0

Method precision:

Precision of the method was conducted by performing the assay of ADMONT-LC tablets 6 times. The samples were prepared six times according to the test preparation mentioned earlier and analyzed by using the test method. The % Assay values were calculated for both the drugs and found to be in between 98.0% - 102.0%. The %RSD values were found to be less than 2.0%. The results were given in the table no 5

Table no .5. Method Precision for Montelukast & Levocetrizine

S.NO.	%ASSAY	
	MONTELUKAST	LEVOCETRIZINE
1	100.9	99.5
2	99.5	99.8
3	99.4	98.7
4	99.7	100.5
5	98.1	101.2
6	100.2	101.4
AVERAGE	99.6	100.2
SD	0.93	1.04
% RSD	0.94	1.04

Limit of Detection and Limit of Quantification:

A study to establish the Limit of Detection and Limit of Quantification of Levocetrizine and Montelukast was conducted. Limit of detection and Limit and quantification were established based on signal to noise ratio. A series of dilutions of the test solution were injected. Limit of detection was established by identifying the concentration which gives signal to noise ratio of about 3. Limit of Quantification was established by identifying the concentration which gives signal to noise ratio of about 10.

The results of the LOQ and LOD are given in the table no .6

Table no .6 .Loq and Lod values for Montelukast & Levocetrizine

Component name	Limit of Detection	Limit of Quantification		
	Concentration(µg/ml)	Concentration(µg/ml)	%Mean recovery	%RSD
Montelukast	0.31	1.21	100.8	0.98
Levocetrizine	0.18	0.75	101.0	1.12

Accuracy:

Accuracy for Levocetrizine and Montelukast was conducted by spiking both the drugs to the placebo powder at different levels of the target concentration (i.e. 50%, 75%, 100 , 125% and 150%) and 50%,150% six times each and remaining concentrations three times respectively. The mean %Recovery and %RSD values were calculated. The %Recovery values for both the drugs were found to be between 98.0% to 102.0% and %RSD values were found to be less than 2.0% .The accuracy results were tabulated in the table No.7 & 8

Table no. 7. Accuracy for Montelukast

S.No.	%Spike level	Amount added(mg)	Amount found(mg)	%Recovery	Statistical parameters
1	50%	49.80	49.72	99.8	Mean=99.9
2		48.95	48.89	99.9	
3		50.10	50.06	99.9	SD=0.08
4		49.89	49.9	100.0	
5		49.92	49.82	99.8	%RSD=0.08
6		49.86	49.79	99.9	
7	75%	74.92	74.8	99.8	Mean=99.9
8		75.01	74.95	99.9	SD=0.05
9		74.95	74.89	99.9	%RSD=0.05
10	100%	99.97	99.91	99.9	Mean=99.9
11		100.02	99.96	99.9	SD=0.02
12		99.95	99.92	100.0	%RSD=0.02
13	125%	124.98	124.95	100.0	Mean=99.9
14		124.95	124.91	100.0	SD=0.02
15		124.96	124.89	99.9	%RSD=0.02
16	150%	149.97	149.91	100.0	Mean=99.9
17		149.95	149.88	100.0	
18		149.91	149.79	99.9	SD=0.03
19		149.93	149.76	99.9	
20		149.91	149.8	99.9	%RSD=0.03
21		149.95	149.89	100.0	

Table no. 8. Accuracy for Levocetrizine

S.No.	%Spike level	Amount added(mg)	Amount found(mg)	%Recovery	Statistical parameters
1	50%	24.97	24.92	99.8	Mean=99.8
2		24.94	24.91	99.9	
3		24.98	24.94	99.8	SD=0.05
4		24.99	24.93	99.8	
5		24.95	24.9	99.8	%RSD=0.05
6		25.01	24.98	99.9	
7	75%	37.47	37.45	99.9	Mean=100
8		37.45	37.46	100.0	SD=0.06
9		37.44	37.41	99.9	%RSD=0.06
10	100%	49.96	49.93	99.9	Mean=99.9
11		49.94	49.89	99.9	SD=0.02
12		49.95	49.90	99.9	%RSD=0.02
13	125%	62.48	62.42	99.9	Mean=99.9
14		62.46	62.41	99.9	SD=0.02
15		62.49	62.41	99.9	%RSD=0.02
16	150%	74.94	74.86	99.9	Mean=99.9
17		74.93	74.89	99.9	
18		74.91	74.87	99.9	SD=0.02
19		74.93	74.89	99.9	
20		74.96	74.89	99.9	%RSD=0.02
21		74.90	74.86	99.9	

Linearity and range:

Linearity of the detector response was established by plotting a graph of concentration versus peak area. A series of solutions of standard were prepared by appropriate dilutions of Linearity standard stock solution.

Preparation of Linearity stock solution:

Weighed accurately and transferred 25.0 mg of Levocetrizine WS and 50mg of Montelukast WS, into 100mL volumetric flask, added 30 mL diluent of the diluent and sonicated for 20min and diluted to the volume with diluent, filtered through 0.45µm filter.

Preparation of Linearity solutions:

Series of solutions in the range of 25% to 150% of target concentration were prepared by transferring 2.5mL, 5.0mL, 7.5mL, 10.0mL, 12.5mL, 15.0mL of Linearity stock solution into separate 25.0mL volumetric flasks and making the volume up to the mark with the diluent .

The detector response was found to be linear in the range of 12. To 75 µg/mL for Levocetrizine 25 to 150 µg/mL for Montelukast. The correlation coefficient values were found to be with in the limits. The linearity and the regression data was tabulated in Tables No:9,10 & 11

Table no.9. Linearity for Montelukast

S.NO.	Linearity level	Concentration (µg/ml)	Peak area
1	25	25	401116
2	50	50	762341
3	75	75	1143654
4	100	100	1524450
5	125	125	1906098
6	150	150	2287356

Fig No.7. Graph Representing Linearity of Montelukast

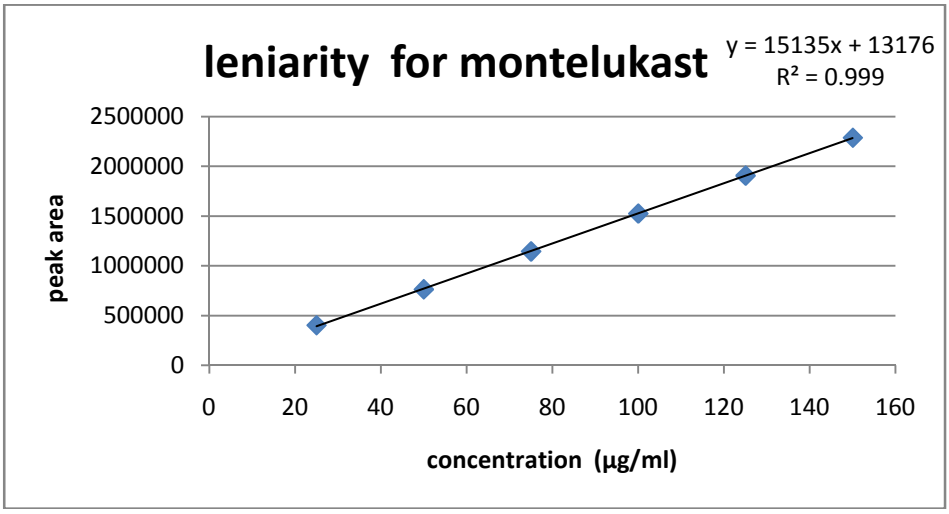


Table No.10. Linearity for Levocetrizine

S.NO.	Linearity level	Concentration(µg/ml)	Peak area
1	25	12.5	303425
2	50	25	506580
3	75	37.5	760315
4	100	50	1013654
5	125	62.5	1267190
6	150	75	1520230

Fig no.8. Graph Representing linearity of Levocetrizine

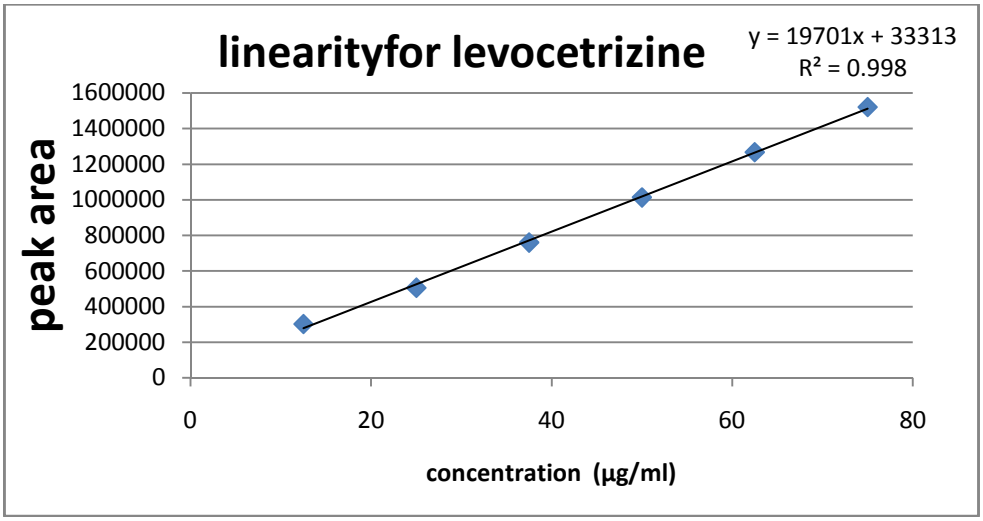


Table no. 11. Regression Data of the Proposed Method

SNO.	PARAMETERS	MONTELUKAST	LEVOCETRIZINE
1	Linearity (µg/ml)	25 – 150	12.5 – 75
2	Regression(mx+c)	15135x+13176	19701x+33313
3	Slope(m)	15135	19701
4	Intercept(c)	13176	33313
5	Correlation coefficient (r^2)	0.999	0.998

Ruggedness:

A study to establish ruggedness of the method was conducted by preparing and analyzing the standard and test preparation on two different days by two different analysts on two different columns and two different HPLC systems. The system suitability parameters and the % Assay values of all the three drugs were calculated and the differences between the two analysts were evaluated and the method was found to rugged. The results were tabulated in the table no 12 &13

Table no.12. Ruggedness for Montelukast

S.no	MONTELUKAST		
	ANALYST-1	ANALYST-2	OVER ALL RESULTS
1	99.4	99.1	MEAN :99 SD:0.8 %RSD:0.8
2	99.5	101.2	
3	99.1	99.4	
4	99.7	100.9	
5	99.2	98.7	
6	98.4	99.2	
AVARAGE	99.2	99.8	
SD	0.5	1.0	
% RSD	0.5	1.0	

Table no.13. Ruggedness for Levocetrizine

S.no	LEVOCETRIZINE		
	ANALYST-1	ANALYST-2	OVER ALL RESULTS
1	98.7	99.7	Mean 99.4 SD 1.0 %RSD 1.0
2	99.1	98.2	
3	101.1	98.4	
4	100.6	98.2	
5	99.9	99.1	
6	100.7	99.4	
AVARAGE	100.0	98.8	
SD	1.0	0.7	
% RSD	1.0	0.7	

Robustness:

A study to establish the effect of variation in flow rate, column temperature, pH of the buffer in the mobile phase was conducted. Standard and test solutions prepared as per the proposed method and were injected into the HPLC system. The system suitability parameters, and the %Assay values were evaluated and the method was found to be robust. All the results were tabulated in the table no.14

Table no.14 Robustness for the Proposed Method

Optimum Conditions	Modifications	Retention time		Asymmetric factor		Theoretical plates		Resolution
		MT	LC	MT	LC	MT	LC	
Mobile phase composition [Buffer:Methanol] (70:30 v/v)	80:20	2.236	4.121	1.16	1.17	5316	5319	5.46
	60:40	1.991	3.321	1.07	1.09	5418	5216	5.31
pH (3.8)	3.7	2.112	3.178	1.09	1.09	5216	5316	5.31
	3.9	2.016	3.601	1.10	1.10	5318	5418	5.36
Column temperature ($30^{o}C$)	25	2.148	3.812	1.12	1.18	5218	5186	5.11
	35	1.986	3.518	1.08	1.09	5316	5216	5.12
Flow rate (1.0 mL/min)	0.9	2.213	4.012	1.12	1.18	5318	5219	5.42
	1.1	1.898	3.431	1.08	1.09	5321	5416	5.51
Wave length (232nm)	230	2.019	3.611	1.09	1.09	5108	5112	5.31
	234	2.112	3.619	1.09	1.09	5118	5216	5.32

Results and Discussions

The drug solution was scanned from 200-400 nm, it was observed that the drug show appreciable absorbance at 232nm., hence detection was set at 232nm for method development purpose. Attempts were made to get good separation of the drug by varying parameters like, flow rate, pH, buffer molarity, buffer components, type of organic modifier, gradient times, and buffer: organic modifier ratio and could get good elution time in isocratic mode. To achieve this, experiments were conducted by changing the columns and mobile shares but unsuccessful in getting good peaks with less run time. Then method was optimized to separate the main peak. The satisfactory chromatographic separation, with good peak shapes were achieved on Symmetry C18 (4.6 x 150mm, 3.5µm, Make: XTerra) or equivalent with mobile phase ph 3.8 Buffer: methanol (70:30) with a flow rate of 1.0 ml/min. All the System Suitability parameters are within the acceptance limits. The calibration curve for Montelukast & Levocetrizine was obtained by plotting the respective peak areas against their concentration. The graph was found to be linear over the range 25-150 µg/ml for Montelukast & 12.5-75 µg/ml Levocetrizine with the correlation coefficient 0.999 & 0.998 respectively .The drug which shows that the good correlation exists between peak area and concentration of the drug. The ruggedness was performed and the % rsd was less than 2, hence, method was rugged. The high % recovery values obtained for the drug show that the method is accurate. The LOD value of Montelukast & Levocetrizine was found to be 0.18 µg/ml, The LOQ was 0.75µg/ml respectively. The low values of LOD and LOQ show that the method is sensitive and can estimate at micro gram level. The absence of additional peaks indicates the method is specific and the drugs were stable in the diluents for 8 hours which is sufficient to complete the work. The stability indicating studies were performed for the above mentioned drug viz…. acid, alkali, Thermal, Humidity, Photolytic, Peroxide and the percentage degradation was 7.2%, 6.1%, 10.4%, 7.9%, 1.2%, 8.9%, and 7.8%, 7.0%, 9.0%, 7.8%, 8.5%,8.0% for Montelukast and Levocetrizine respectively.

Conclusion

The proposed R.P. high-performance liquid chromatographic method has been evaluated for the accuracy, precision and linearity. The method was found to be precise, accurate and linear over the linear concentration range. In this method, there was no interference from matrix sources. Moreover, the lower solvent consumption along with the short analytical run time of 6 minutes that allows the analysis of a large number of samples in a short period of time. Therefore, this HPLC method can be used as a routine analysis of these drugs in bulk, pharmaceutical formulations and also for stability studies.

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