



Method Development, Validation and Rapid Determination of Fexofenadine Hydrochloride Drug By Spectrophotometric Technique.

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Abstract : A SIMPLE, SENSITIVE, PRECISE AND UV SPECTROPHOTOMETRIC METHOD HAS BEEN DEVELOPED AND VALIDATED FOR THE ANALYSIS OF FEXOFENADINE HYDROCHLORIDE, THIS METHOD IS USED FOR THE DETERMINATION OF COMPOUNDS IN COMMERCIAL PHARMACEUTICAL PRODUCTS. THE COMPOUNDS WERE WELL SEPARATED UTILIZING A MOBILE PHASE CONSISTING OF ACETONITRILE: PHOSPHATE BUFFER (45:55, V/V, PH 7.0) WITH UV DETECTION AT 220 NM. VALIDATION RESULTS CONFIRMED, THE PROPOSED METHOD WAS FOUND TO BE SPECIFIC, ACCURATE, PRECISE AND RAPID. HENCE THE SAME CAN BE APPLIED TO THE QUANTITATIVE ANALYSIS OF TABLETS CONTAINING FEXOFENADINE HYDROCHLORIDE.

Keywords - Fexofenadine Hydrochloride, UV- Spectroscopy, Method validation.

I. INTRODUCTION

Fexofenadine Hydrochloride, The Active Ingredient of Telfast And Allegra, Is a Second – Generation Histamine H₁ Receptor Antagonist With The Chemical Name α, α - Dimethyl-4-[1-Hydroxy-4-[4-(Hydroxydiphenyl-Methyl)-1-piperidiny] butyl]-Benzene acetic acid. It is Non Sedating Antihistamine. Fexofenadine Hydrochloride is used as The Hydrochloride Salt in the Symptomatic relief of allergic Conditions including Seasonal allergic rhinitis and urticaria. (1,2) Fexofenadine (tradenames Allegra, Fexodin, Telfast, Fastofen, Tilfur, Vifas, Telfexo, Allerfexo) is an antihistamine pharmaceutical drug used in the treatment of allergy symptoms, such as hay fever, nasal congestion, and urticaria. [3] Fexofenadine is sometimes called a third-generation antihistamine because it is less able to pass the blood-brain barrier and cause sedation, compared to first-generation antihistamines. [4] Fexofenadine has been demonstrated to be safe and effective for children ages 2–5 years old and 6–11 years old in treatment of seasonal allergic rhinitis. [5,6] The proposed method is optimized and validated as per the International Conference on Harmonization (ICH) guidelines [7-8].

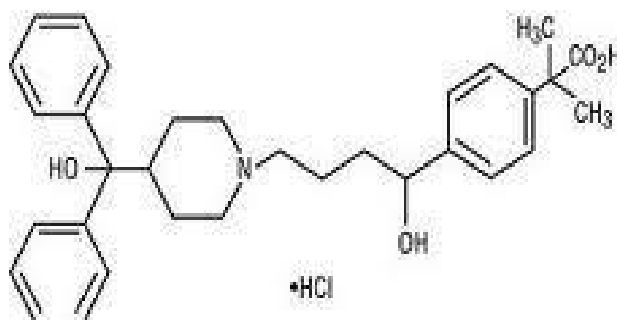


Fig.1. Fexofenadine hydrochloride.

II. MATERIALS AND METHODS:

Chemicals and reagents:

Active pharmaceutical ingredient of fexofenadine Hydrochloride was procured from Daksh pharma ltd. Fexodin table dosage form was procured from the pharmacy.

PREPARATION OF TEST SOLUTION:

METHOD DEVELOPMENT :

1. Optimization of the Spectrometric conditions: Mobile phase containing Acetonitrile and phosphate buffer was initially used.

Preparation of buffer:

10mM phosphate buffer was prepared in water and pH was adjusted to 7.0 with NaOH solution

Preparation of mobile phase :

Mix buffer and acetonitrile in the ratio of 45:55 v/v, mobile phase is degassed before use.

Preparation of Standard Solutions:

The stock solution of Fexofenadine hydrochloride ($100\mu\text{g mL}^{-1}$) was prepared by dissolving 10 mg of Fexofenadine Hydrochloride

(99.9 %) in a 100 mL volumetric flask (stock solution) make up with diluent up to the mark.

Transferred (10,15,10,5, 15mL) of each stock solution to a different volumetric flask and diluted up to the mark with diluent s. This is working standard solution containing (10,15,20,25 and $30\mu\text{g/ml}$) of Fexofenadine Hydrochloride.

Preparation of test solution:

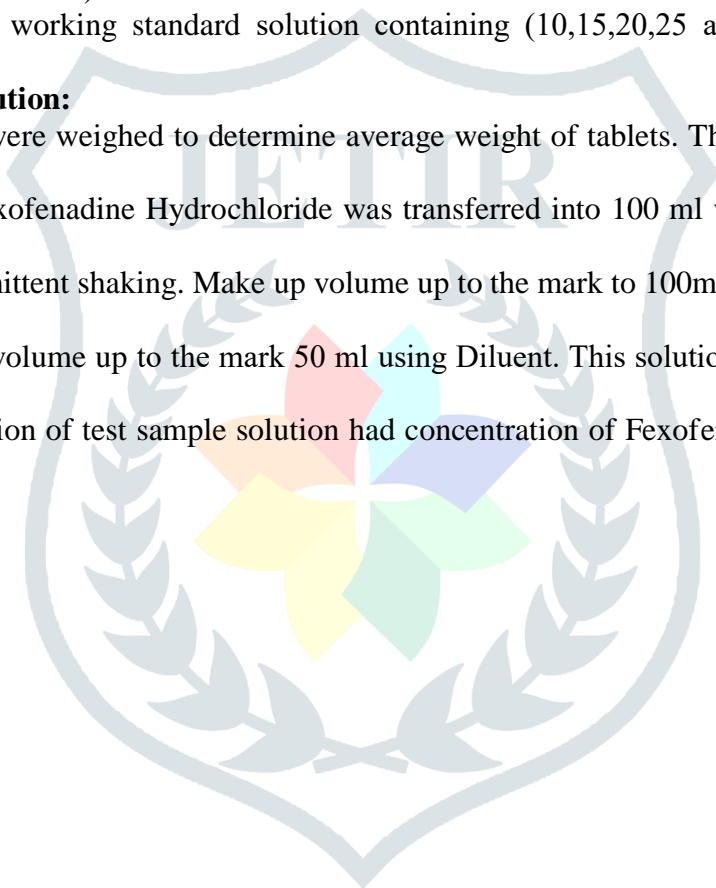
Accurately 20 Tablets were weighed to determine average weight of tablets. Then tablets were finely crushed and powder

equivalent to 10 mg Fexofenadine Hydrochloride was transferred into 100 ml volumetric flask. Added 70 ml diluent and sonicated

for 5 minute with intermittent shaking. Make up volume up to the mark to 100ml. From that solution take 10ml of Sample Solution

was used and make up volume up to the mark 50 ml using Diluent. This solution was filtered through $0.45\mu\text{m}$ nylon syringe filter

and the final concentration of test sample solution had concentration of Fexofenadine Hydrochloride $20\mu\text{g/ml}$ respectively.



III.METHOD VALIDATION

The objective of the method is to demonstrate that the method is suitable for its intended purpose as it is stated in ICH guidelines. The above method was validated according to ICH guidelines to establish the performance characteristic of a method (expressed in terms of analytical parameters) to meet the requirements for the intended application of the method. They were tested using the optimized Spectrometric conditions and instruments.

Specificity:

spectral purities of Fexofenadine HCL Spectra were evaluated for the interference of the tablet excipients, degradation components or due to the presence of impurity as per the methodology. In the work, a solution of the tablet excipients were prepared using the sample preparation to evaluate possible interfering peaks.

Linearity:

Linearity of the method was determined by mean of calibration graph using an increasing amount of each analyst. Linearity was evaluated by visual inspection of a calibration graph. The calibration curves were plotted over a concentration range of 10-30 µg/ml for Fexofenadine. The stock solution of Fexofenadine hydrochloride (100µg mL⁻¹) was prepared by dissolving 10 mg of Fexofenadine Hydrochloride (99.9 %) in a 100 mL volumetric flask (stock solution) make up with diluent up to the mark. Transferred (10,15,10,5, 15mL) of each stock solution to a different volumetric flask and diluted up to the mark with diluents. This is working standard solution containing (10,15,20,25 and 30µg/ml) of Fexofenadine Hydrochloride. Refer-Table no.2, Linearity of Fexofenadine Hydrochloride The absorbance of solution was then measured at 220nm curves were constructed by plotting absorbance versus concentration and the regression equations were calculated.

Table .2 Linearity concentration level of Fexofenadine HCL

Standard weight	Diluted to	ml taken	Diluted to	PPM	% Level
10	100	10	100	10	50
10	100	15	100	15	75
10	100	10	50	20	100
10	100	5	20	25	125
10	100	15	50	30	150

ACCURACY:

The accuracy of the method was determined by recovery experiments known concentration of working standard was added to the fixed concentration of the pre-analyzed tablet sample. percent recovery was calculated by comparing the area with pre-analyzed sample for both the drugs, recovery was performed at 50%,100%,150% level and percentage recovery was calculated . data from the linearity was considered for accuracy.

PRECISION:

The precision of an analytical procedure expresses the closeness of agreement between a series of measurement obtained from multiple sampling of the same homogenous sample under prescribed conditions. repeatability of the method was checked by injecting replicate injection of 20µg/ml of solution for 6 times. the mean area and % reactive standard deviation (RSD) was calculated. %RSD should not be more then (NMT) 2%.

INTERMEDIATE PRECISION:

The intermediate precision of the assay method is established by comparison of two independent repeatability experiment on 2 different days the data of the 1st day is taken from the analysis of “repeatability” the second set of experiment is performed by a different analyst and HPLC system as well. The standard deviation, relative standard deviation and mean value difference is calculated from the results obtained on each day.

ROBUSTNESS:

The robustness of analytical procedure is a measure of its capacity to remain unaffected by small, but deliberate variations in method parameter and provides an indication of its reliability during normal usage.it was observed that the variation like flow rate & mobile phase composition, Variation in wavelength by ± 2 nm.etc.

IV. RESULT AND DISCUSSION:

The Fexofenadine hydrochloride showed maximum absorbance at 220 nm. The proposed method for estimation of Fexofenadine HCL drug was validated as per the ICH guidelines.

SPECIFICITY:

By comparing the Spectra of blank, placebo solution, reference solution & test solution is it observed that there is no interference of any peaks at the retention time of Fexofenadine Hcl. The retention time of the main peaks in the Spectra obtained with the reference solution & test solution are matching. This confirmed the specificity of the method.

Fig no.4 Spectra of standard solution

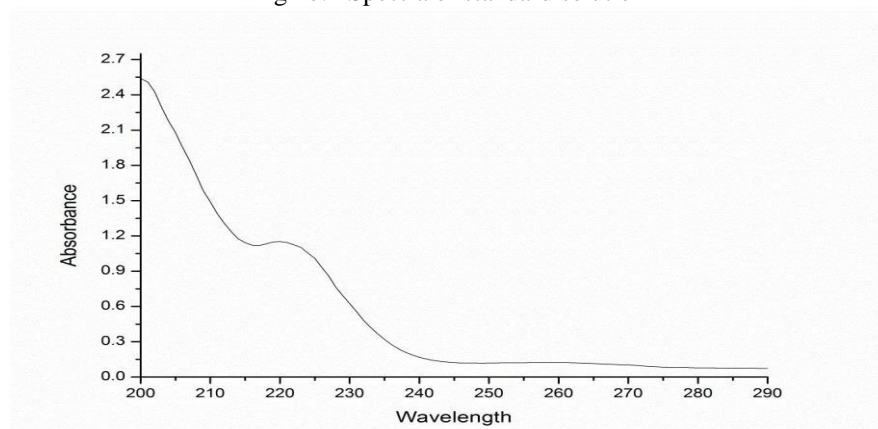
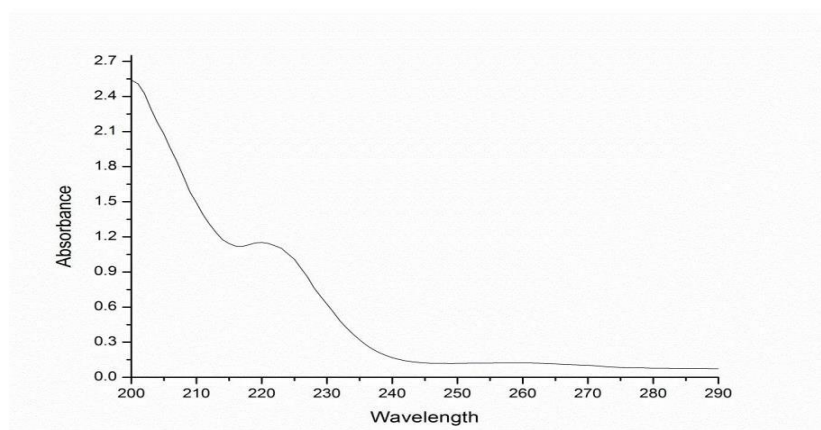


Fig no.5 Spectra of sample solution

**LINEARITY :**

Five concentration such as 10,15,20,25,30 µg/ml for fexofenadine HCL and linearity graph was plotted using concentration verses peak area and shown in figures no (7). A linear relationship was obtained between peak area and quantity analyzed in the range of 50 to 150 %.

Fig no. 7 Linearity plot of Fexofenadine HCL.

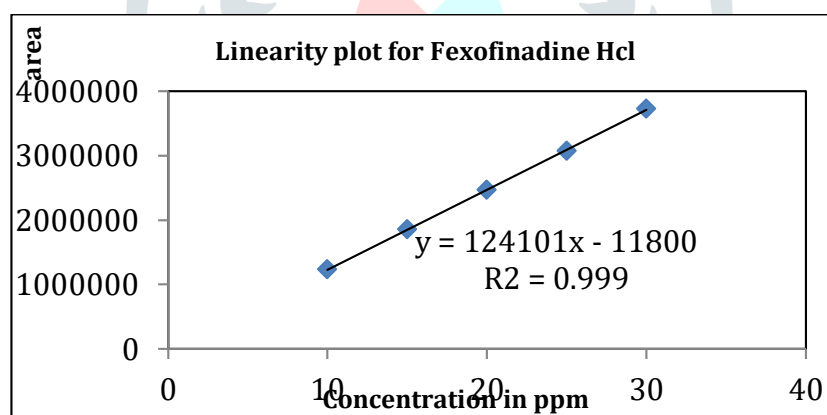


Table no .3 linearity of solution

Parameter of linearity	Value	Acceptance criteria
Correlation coefficient R	0.999	Not less then 0.997

The method is considered to be linear in the range on 10-30 µg/ml for Fexofenadine HCL and correlation coefficient & y- axis intercept should be within the limit.

ACCURACY:

The percentage recovery of Fexofenadine HCL is 99.83 %. which shows the accuracy of the method. ref table no. (4) For recovery at different concentration levels. The recovery values between prescribed limit of 98-102 % shown that method is free from interference of excipients present in formulation.

Table no. 4 Accuracy of method

ACCURACY LEVEL	% RECOVERY OF FEXOFENADINE HCL
50%	99.5
100%	100.5
150%	99.5
MEAN RECOVERY	99.83

PRECISION:

The exactness of the method as defined by precision and method is considered to be precise as since the relative standard from 6 determination is well within the acceptance limit. Refer table.5 Precision of method

Table no .5 Precision of method

Sample no.	% assay of Fexofenadine HCL
Sample 01	100.1
Sample 02	99.9
Sample 03	99.8
Sample 04	99.9
Sample 05	100.1
Sample 06	100.2
Mean	100.0
STD DEV	0.15
%RSD	0.16

INTERMEDIATE PRECISION :

The intermediate precision of the assay method is established by comparison of two independent repeatability experiments on 2 different days. Refer table no.6 Intermediate precision.

Table no.6 Intermediate precision

Sample no.	% assay of Fexofenadine Hcl
Sample 01	100.1
Sample 02	99.8
Sample 03	99.9
Sample 04	100.2
Sample 05	99.7
Sample 06	99.8
Mean	99.92
Std dev	0.19
% RSD	0.19

Conclusion

In this present work a new simple, selective, linear, precise and accurate UV Spectroscopy method was developed and validate for estimation of Fexofenadine HCL in pharmaceutical tablet dosage form in accordance with the ICH guidelines. This method gives short analysis time, reproducible and showed data for all the method validation parameter. thus, The method is very simple and all peaks are well separated and there is no interference by excipients peaks with total run time, which makes it especially suitable for routine quality control analysis work. The method can be used for individual analysis of the titled drugs or their binary combination.

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