Spectrophotometric Determination of Fexofenadine Hydrochloride

K. SURESH KUMAR*, V. RAVICHANDRAN[1], M. K. MOHAN MARUGA RAJA[2], R. THYAGU[2] AND A. DHARAMSI

Department of Pharmaceutical Analysis, K. M. C. H. College of Pharmacy, Coimbatore-641 035, [1]Department of Pharmaceutical Chemistry, Dr. H. S. Gour Vishwavidyalaya, Sagar-470 003, [2]J. S. S. College of Pharmacy, Ooty-643 001, India.

A simple and sensitive spectrophotometric method has been developed for the determination of fexofenadine hydrochloride in bulk and pharmaceutical dosage forms. The method is based on the chloroform-extractable pale yellow colour complex formed by the reaction of fexofenadine with bromothymol blue at pH 2.6. The chromogen can be estimated at 412 nm against a reagent blank. This method obeys Beer's law in the concentration range of 10-50 µg/ml of the drug. The optimum reaction conditions and other analytical parameters were also evaluated. The proposed method has been successfully applied to the analysis of bulk drugs and their dosage forms.

Fexofenadine is, chemically, 2,2-dimethyl-4(1-hydroxy-4-{hydroxy diphenylmethyl-1- piperidinyl}butyl)benzoaceticacid[1]. It is not official in IP, BP and USP. A few HPLC[2-4] and spectrophotometry[5] methods have been reported for the estimation of fexofenadine in pure form and in biological fluids. In the present work, we have made an attempt to develop a simple and sensitive spectrophotometric method for the estimation of fexofenadine in pharmaceutical dosage forms.

An Elico UV/Vis spectrophotometer SL - 150 with 1 cm matched quartz cells was used for absorbance measurements. All reagents used were of analytical grade. Bromothymol blue reagent (0.5%) was prepared in phosphate buffer pH 2.6 and washed with chloroform to remove soluble impurities. A standard drug solution of fexofenadine (1 mg/ml) was prepared in acetonitrile.

Standard drug solution (100 µg/ml) was serially diluted with acetonitrile to give solutions with concentrations in the range of 10-50 µg/ml of fexofenadine. Ten millilitres of each solution was taken in a separating funnel. Three millilitres of bromothymol blue reagent and 10 ml of chloroform was added and the mixture shaken gently for 5 min and allowed to stand for 5 min. The chloroform layer was separated out and absorbance was measured at 412 nm against reagent blank. A calibration curve was plotted using absorbance versus concentration.

***For correspondence**

E-mail: pharmsuki@yahoo.co.in

Fexofenadine tablets - Alernex (Dabur), Fexo (Torrent) and Fexofen (Aristo) - were powdered, and powder equivalent to 100 mg of fexofenadine was accurately weighed and transferred to a 10 ml volumetric flask. Five millilitres of acetonitrile was added and shaken for 5 min to get a solution and filtered through Whatman filter paper No. 41 into another 10 ml volumetric flask. The filter paper was washed with acetonitrile; washings were added to the filtrate, and final volume was made up with acetonitrile and treated as described in the above procedure.

The synthetic mixture containing fexofenadine and common excipients such as lactose, methyl cellulose, talc, magnesium stearate and starch was also prepared and evaluated as above. The effects of change in reagent concentration and volume were studied at 412 nm for a fixed concentration of fexofenadine. The stability of the coloured complex was studied at an interval of every 5

TABLE 1: OPTICAL CHARACTERISTICS AND PRECISION DATA

Parameters	Values
λ_{max}	412 nm
Beer's law limit	10-50 µg/ml
Molar absorptivity (1/mol/cm)	2.3×10^4
Sandell's sensitivity (µg/cm^2/ 0.001 A.U.)	0.043
Slope	0.0206
Intercept	0.0102
Regression equation [Absorbance (Y) vs concentration (µg/ml)]	Y = 0.0102 + 0.0206 (X)
Correlation coefficient	1.0023
Relative standard deviation	0.6721

Where X is the concentration of fexofenadine in µg/ml, and Y is the absorbance at 412 nm. A.U. denotes absorbance unit

TABLE 2: ESTIMATION OF FEXOFENADINE IN TABLETS

Sample	Labelled amount (mg/tablet)	Amount found by proposed method (mg) ± SD	Percentage recovery* ± SD
Alernex	120	119.53 ± 0.12	98.52 ± 0.25
Fexo	120	118.74 ± 0.21	99.33 ± 0.13
Fexofen	120	120.03 ± 0.18	99.50 ± 0.17
Synthetic mixture			
Fexofenadine + Lactose	120 + 100	119.40 ± 0.08	99.02 ± 0.33
Fexofenadine + Talc	120 + 100	120.23 ± 0.12	99.62 ± 0.34
Fexofenadine + Magnesium stearate	120 + 100	117.93 ± 0.32	97.78 ± 0.14

*Average of five determinations. SD denotes standard deviation

min up to 60 min, using fixed concentration (30 µg/ml) of fexofenadine at room temperature (37 ± 0.5°).

To ensure the accuracy and reproducibility of the results obtained, known amount of fexofenadine (1 ml of 1 mg/ml) reference solution was added to previously analyzed sample solution. Then the solution was treated as described in the above procedure. Absorbance of coloured extract was measured at 412 nm.

Fexofenadine forms an ion-association complex with bromothymol blue in the ratio of 1:1 and gives chloroform-extractable coloured complex. The above-mentioned complex formed because of the reaction of the basic drug with acidic dye. The absorption spectrum of the chloroform extract showed maximum absorption at 412 nm. The blank reagent has no absorbance at this wavelength. The Beer's law obeyed in the concentration range of 10-50 µg/ml. The chloroform extract was found to be stable for 20 min, after which intensity of colour decreased gradually.

Temperature of the reaction, quantity, concentration and addition of various reagents were optimised after several experiments. The optimum quantity and concentration of bromothymol blue are 3 ml and 0.5% w/v in buffer pH 2.6 respectively. Bromothymol blue in different buffer solutions (pH 2, 4, 7 and 9) was also tried, but it was found that there was no colour development. The optimum temperature was found to be 37 ± 0.5°.

The optical characteristics are given in Table 1. Precision was determined by analyzing five replicate samples containing a known amount of fexofenadine. Recovery experiments revealed good accuracy of the data (Table 2). It was found that it is unnecessary to separate soluble excipients present in various marketed tablets before analysis since the results of analysis were always reproducible and equivalent to the labelled contents of the preparations.

ACKNOWLEDGEMENTS

The authors are thankful to Dr. Nalla G. Palaniswami, Chairman; and Dr. Thawamani D. Palaniswami, KMCH College of Pharmacy, Coimbatore, for providing the necessary facilities to carry out the work.

REFERENCES

1. Budavari, S., Eds., In; The Merck Index, 12th Edn., Merck and Co. Inc., Whitehouse Station, NJ, 1996, 4110.
2. Hofmann , U., Seiler, M., Drescher, S and Framm, M., **J. Pharm. BioMed. Anal.**, 2002, 29, 681.
3. Uno, T., Yasui–Furukori, N., Hata, T. and Sugawara, K., **J. Pharm. BioMed. Anal.**, 2004, 35, 937.
4. Fu, I., Woolf, E.J. and Matuszewski, B.K., **J. Pharm. BioMed. Anal.**, 2004, 35, 837.
5. Fawzia, G. and El-Yazbi, **J. Pharm. BioMed. Anal.,** 2003, 3, 801.

Accepted 30 December 2006
Revised 3 April 2006
Received 25 July 2005
Indian J. Pharm. Sci., 2006, 68 (6): 841-842