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EXTRACTIVE SPECTROPHOTOMETRIC METHODS FOR ESTIMATION OF CITALOPRAM HYDROBROMIDE IN BULK AND PHARMACEUTICAL FORMULATION

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ABSTRACT

Two simple economical, accurate and reproducible visible spectrophotometric methods (A and B) have been developed for the estimation of citalopram hydrobromide in bulk and tablet formulations. The developed methods are based on the formation of colored chloroform extractable ion-pair complexes of drug with bromocresol green (BCG) and bromophenol blue (BPB) in acidic medium. These chloroform extractable ion-pair complexes showed the absorption maxima at 415 nm. Beer's law plot is linear over the concentration range of 5-20 µg/mL for both methods. The different experimental parameters affecting the development and stability were studied carefully and optimized. Results of analysis for both the methods were validated statistically and by recovery studies.

Key words: Citalopram hydrobromide, Bromocresol green, Bromophenol blue, U. V. Spectrophotometry.

INTRODUCTION

Citalopram[1] hydrobromide is a recently developed antidepressant drug and it is chemically 1-[3- (dimethylamino) propyl]-1-[4-flourophenyl]-1, 3-dihydro-5-iso-benzo furan-carbonitrile hydrobromide. It is a selective serotonin re-uptake inhibitor[2]. Few analytical methods for estimation of Citalopram hydrobromide from biological fluid, including GC[3], GLC[4], HPLC[5-7], capillary liquid chromatography[8] and spectrophotometry[9,10] are reported. In the present work, an attempt has been made to develop simple, economical, accurate and reproducible visible spectrophotometric methods

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for routine analysis of citalopram hydrobromide and its formulation.

EXPERIMENTAL

Instrument

Schimadzu U. V-Visible spectrophotometer-1201 with 1 cm matched quartz cells was used for all spectral measurements.

Reagents

All the chemicals used were of analytical reagent grade.

(i) Bromocresol green (0.1% w/v) – It was prepared by dissolving 50 mg of bromocresol green in 2 mL of 0.02M NaOH and volume was made up to 50 mL with distilled water.

(ii) Potassium hydrogen phthalate buffer of pH 3.0 and 3.4 were prepared as per I. P 1996.

(iii) Bromophenol blue (0.04% w/v) – It was prepared by dissolving 20 mg of bromophenol blue in chloroform and volume was made up to 50 mL with chloroform.

(iv) Chloroform A. R grade.

Procedure

Preparation of standard stock solution – A standard stock solution containing 1mg per mL was prepared by dissolving 100 mg of citalopram hydrobromide in 100 mL distilled water. From this, a working standard solution containing 100µg/mL was prepared with distilled water.

Preparation of standard curve

Method A: Various aliquots of 0.5 mL – 2.0 mL (100 µg/mL) of drug solution were pipetted into series of 125 mL separating funnel followed by the addition of 2 mL of buffer (pH 3.0) and 2 mL of dye solution (0.1%w/v). The aqueous layer of each separating funnel was adjusted to 10mL with distilled water and extracted with 10 mL chloroform. The chloroform layer was collected and the absorbance of resulting solution in the concentration range of 5-20 µg/mL was measured at 415 nm against reagent blank. Calibration curve was constructed from the absorbance values so obtained.

Method B : Aliquots of 0.5 mL – 2.0 mL (100 µg/mL) of drug solution were transferred into different 125 mL separating funnel followed by the addition of 2 mL of buffer (pH 3.4) and 3 mL of dye solution (0.04%w/v). The volume of aqueous layer of each separating funnel was adjusted to 10 mL with distilled water and then extracted with 10 mL chloroform. The chloroform layer was collected and the absorbance of resulting solution was measured at 415 nm against reagent blank. Calibration curve was prepared from absorbance values obtained.

Preparation of sample solution

Tablet containing citalopram hydrobromide was successfully analyzed by the proposed methods. Twenty tablets of citalopram hydrobromide were accurately weighed and average weight was calculated. Tablet powder equivalent to 10 mg of drug was weighed and dissolved in distilled water. Then volume was made up to 100 mL with distilled water and filtered. The filtrate was suitably diluted to produce drug concentration of 10 µg/mL and analyzed as per procedure given under preparation of calibration curve. The results were represented in Table 2. None of the excipients usually employed in the formulation of tablets interfered in the analysis of citalopram hydrobromide by the proposed methods.

Recovery studies

In order to ensure suitability and reliability of proposed methods, known amounts of pure drug were added to previously analyzed formulated samples and these samples were reanalyzed by the proposed methods by performing recovery experiments. The percentage recoveries thus obtained are given in Table 2.

RESULTS AND DISCUSSION

In the present work, two methods have been developed for the estimation of citalopram hydrobromide in bulk drug and its formulation. The proposed methods A and B are based on formation of chloroform extractable colored complexes with bromocresol green and bromophenol blue, respectively. The conditions required for the formation of colored complexes were optimized. Statistical analysis was carried out and the results were found satisfactory. Relative standard deviation values were low indicating the reproducibility of the proposed methods. Recovery studies were close to 100%, which indicates the reliability and suitability of the proposed methods. The optical characteristics such as absorption maxima, Beer's law limits, molar absorptivity and Sandell's sensitivity are presented in Table 1. The regression analysis using the method of least squares was

made for slope (m), intercept (b) and correlation obtained from different concentrations and the results are summarized in Table 1.

Table 1. Optical characteristics and precision data

Parameters	Method A	Method B
λ_{max} (nm)	415	415
Beer's law limits	5-20 µg/mL	5-20 µg/mL
Molar absorptivity (L/mol. cm)	1.06×10^4	1.20×10^4
Sandell's sensitivity (mcg/cm^2/0.001 absorbance unit)	0.0308	0.0268
Regression equation*(y)		
Slope (m)	0.03246	0.03246
Intercept	0.005	0.002
Correlation coefficient (r)	0.9999	0.9999
Precision (%RSD)	0.197	0.586

*Y = mx + c, where x is the concentration in µg/mL and Y is the absorbance unit.

Table 2. Assay of citalopram hydrobromide in tablets

Sample	Labelled amount (mg)	Amount obtained by proposed method* (mg)		**% Recovery by the proposed method	
		Method A	Method B	Method A	Method B
1	10	10.10	10.07	100.34	101.12
2	10	10.11	10.06	100.48	100.25

*Average of five determinations,
**After spiking the sample.

In conclusion, the proposed methods are simple, sensitive, precise, reliable and reproducible for the routine estimation of citalopram hydrobromide in bulk as well as in tablet formulations.

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REFERENCES

1. S. Budvari, Eds., in; The Merck Index, 12th Edn., Merck and Co., Inc., Whitehouse Station, NJ, (1996) p. 391.
2. Mary J. Mycek, Richard and D. Howland, Lippincotts Illustrated Reviews , Pharmacology, Lippincotts Williams and Wilkin Publishers, 3rd Edition (2006) pp. 139-141.
3. C. B. Eap, G. Bouchoux, M. Amey and N. Cochard, J. Chromatogr. Sci., **36**, 365 (1998).
4. M. A. Martinex, C. Sanchez, C. Tarrae and E. Almarza, J. Anal. Toxicol, **28**, 174 (2004).
5. J. Macek, P. Ptecek and J. Klima, J. Chromatogr. B. Biomed. Sci. Appl., **755**, 79 (2001).
6. O. V. Olesen and K. Linnet, J. Chromatoger. B. Biomed. Sci. Appl., **675**, 83 (1996).
7. L. Kristoffersen, A Bugge, E. Lundanes and L. Slordal, J. Chromatography B; Biomed. Sci. Appl., **734 (2)**, 229-246 (1999).
8. P. Molander, A. Thomassen, L. Kristoffersen and T. Greibrokk, J. Chromatogr. B. Anal. Technol. Biomed. Life Sci., **766**, 77 (2002).
9. A. Razo, Chemical and Pharm. Bull., **54**, 432-434 (2006).
10. S. Pillai, I. Singhvi, Ind. J. Pharm. Sci., **68 (5)** , 682-684 (2006).

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