INTERNATIONAL JOURNAL OF APPLIED BIOLOGY AND PHARMACEUTICAL TECHNOLOGY

Volume: 2: Issue-1: Jan-Mar -2011 IJABPT *ISSN 0976-4550*

NEW SPECTROPHOTOMETRIC METHODS FOR THE DETERMINATION OF LORNOXICAM IN PHARMACEUTICAL DOSAGE FORMS

E.Venumadhav[1], T.Neeha[2], P.Bhargavi[2], Amreen Nishat[2], A.Swetha[2]and G.Devala Rao[2]*

[1]Department of Biotechnology, Acharya Nagarjuna University, Nagarjuna Nagar
[2]K.V.S.R Siddhartha college of Pharmaceutical Sciences, Vijayawada-520010, A.P., India.

ABSTRACT: Two simple and sensitive visible spectrophotometric methods (A & B) for the determination of Lornoxicam (LOC) in bulk and pharmaceutical dosage forms are described. Method A is based on oxidation of drug with Ferric Chloride and subsequent complexation of Fe(II) with 2, 2' Bipyridine to form a blood red colored species (λ_{max} :520 nm). Method B is based on oxidation of LOC with Ferric Chloride and chelation of Fe (II) with Bathophenanthroline to produce a blue colored chromogen ($\lambda_{max: 610}$ nm). These methods were extended to the analysis of pharmaceutical formulations and results compared with the reference method.

Key words: Lornoxicam, Spectroscopy, Dosage forms

INTRODUCTION

Lornoxicam[1, 2, 3, 4] which is chemically 6-Chloro-4-hydroxy-2-methyl-N-2-pyridinyl-2H-thieno [2, 3-e]-1, 2-thiazine-3-carboximide 1, 1-dioxide is a non- steroidal anti-inflammatory drug with analgesic properties and belongs to the class of oxicams (Figure-1). A number of methods such as HPLC [5, 6, 7], UV Spectrophotometric methods were reported for the estimation of Lornoxicam. Literature survey reveals that visible spectrophotometric methods have not been reported for its quantitative determination in its bulk form and pharmaceutical formulations. In the present investigation two simple and sensitive spectrophotometric methods have been developed for the determination of Lornoxicam. The developed methods involve the formation of colored complexes based on secondary aromatic amino group present in the drug. Method A is based on the oxidation followed by complex formation with 2, 2' Bipyridine to form a colored species. Method B is based on the oxidation followed by complex formation with Batho- Phenanthroline to form a blue colored species. Beer's law is obeyed and the results of analysis for the two methods have been validated statistically and by recovery studies.

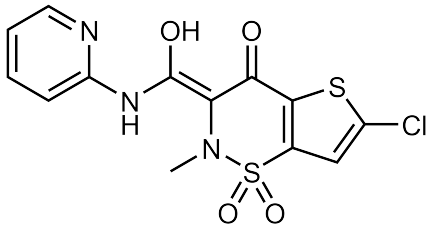

Figure-1: Chemical structure of Lornoxicam

MATERIALS AND METHODS

Instrument

A Systronics Model 2201 UV-VIS spectrophotometer was used for the measurements.

Reagents

All the chemicals used were of analytical grade.

Aqueous solutions of 2, 2' Bipyridine (0.156%w/v in 0.1N HCl), Batho- Phenanthroline (0.332%w/v in ethanol), Ferric Chloride (0.003M), Ortho phosphoric acid solution (1.3 ml in 100 ml distilled water) were prepared.

Standard Drug Solution

The stock solution (1mg/ml of free base) of Lornoxicam was prepared by dissolving 51.67 mg of the drug in 100 ml of water. The stock solution was further diluted to get 100 µg/ml required working standard solution.

Procedures

Method A:

Aliquots of standard drug solution (3-20 µg/ml) were transferred into a series of 10 ml volumetric flasks. A 1.0 ml portion of Ferric Chloride (0.003M) solution was added to each flask and then 1.0 ml of 2, 2' -Bipyridine was added. The volume was equalized with water and kept for boiling for 20 minutes. The flasks were cooled to room temperature and 2.0 ml of O-phosphoric acid was added to each flask, finally the volume was brought to 10 ml with distilled water. The absorbances were measured at 520 nm against a reagent blank. The concentration of LOC was computed from its calibration graph.

Method B:

Aliquots of standard drug solution (2-10 µg/ml) were transferred into a series of 10 ml volumetric flasks. A 1.0 ml portion of Ferric Chloride (0.003M) solution was added to each flask and then 1.0 ml of Batho- Phenanthroline was added. The volume was equalized with water and kept for boiling for 15 minutes. The flasks were cooled to room temperature and 2.0 ml of O-phosphoric acid was added to each flask, finally the volume was brought to 10ml with distilled water. The absorbances were measured at 610 nm against a reagent blank. The concentration of LOC was computed from its calibration graph.

Analysis of Pharmaceutical Formulations

Twenty tablets of LOC were weighed and powdered. A quantity of tablet powder equivalent to 51.67 mg of LOC was accurately weighed and transferred into a 100 ml volumetric flask containing 100 ml of distilled water. The solution was sonicated for 15 minutes, filtered through cotton wool and the filtrate was made upto volume with water. This solution was further diluted to obtain 100 µg/ml solution and analysed as per above procedures.

Recovery Studies

To study the accuracy, reproducibility and precision of the proposed methods, recovery studies were carried out. Recovery of the added standard was studied at three different levels.

RESULTS AND DISCUSSION

The optimum conditions for each method were established by varying one parameter at a time and keeping the others fixed and observing the effect of the product on the absorbance of the colored species and incorporated in the procedure. The optical characteristics and figures of merit are given in Table 1, together with the regression equations obtained by linear least square treatment for the calibration plots. The precision and accuracy were formed by analyzing six replicate samples and containing known amount of drug and their results were summarized in Table 1. Table 2 shows that the values of percentage recovery are between 98%-102% and values of coefficient variation are sufficiently low indicating that the proposed methods are free of interferences from excipients like starch, talc etc; and the results are reproducible. The systematic study revealed that the proposed methods for the determination of LOC are simple, selective and sensitive with reasonable precision and accuracy. They can be used as alternative methods to reported ones for the routine determination of LOC in pure and in pharmaceutical formulations.

Table-1 : Optical Characteristics, Regression Data, Precision, and Accuracy of the Proposed Methods for LOC.

Parameter	**Method A**	**Method B**
λ_{max}(nm)	520	610
Beer's law limit(µg/ml)	3-20	2-10
Molar absorptive ($L\ mol^{-1}\ cm^{-1}$)	1.2057×10^{4}	4.854×10^{4}
Detection limits(µg/ml)	0.0789	0.0403
sand ell's sensitivity ($\mu g/cm^2$/0.001 abs. unit)	0.0324	0.0081
OptimumPhotometric range(µg/ml)	10-20	1.5-5.5
Regression equation(Y=a+bc) Slope(b)	0.0307	0.1243
Standard Deviation of Slope (S_b)	4.859×10^{-5}	4.21×10^{-4}
Intercept(a)	0.00033	0.00046
Standard error of estimation(S_e)	1.01×10^{-3}	2.22×10^{-3}
Standard deviation of intercept(S_a)	7.36×10^{-4}	1.51×10^{-3}
Correlation coefficient(r)	0.9997	0.9999
%Relative standard deviation*	0.565	0.8158
%Range of Error (Confidence limits)* 0.05 level 0.01 level	 0.593 0.938	 0.856 1.342
%Error in bulk samples**	0.37	0.15

*Average of six determinations. ** Average of three determinations

Table-2: Assay and Recovery of LOC in Dosage Forms.

Method	Pharmaceutical Formulation	Labelled Amount (mg/tablet)	Proposed Method			Found by Reference Method[6] ± S.D	% recovery by Proposed Methods**± S.D
			Amount Found*(mg)± S.D	t(value)	F(value)		
A (BPD)	Brand-1	4	4.05±0.082	0.165	2.534	4.02±0.008	100.8±0.50
		8	8.01±0.009	0.183	2.475	7.95±0.011	100.9±0.61
	Brand-2	4	4.02±0.008	0.075	1.104	3.93±0.012	99.61±1.01
		8	7.95±0.011	0.984	1.985	8.04±0.017	99.38±0.64
B(BPTL)	Brand-1	4	3.98±0.012	0.676	1.401	4.01±0.015	99.70±0.79
		8	8.02±0.013	0.391	1.601	8.03±0.010	100.1±0.15
	Brand-2	4	3.99±0.014	0.512	2.012	3.91±0.008	99.42±0.69
		8	7.94±0.012	1.452	1.582	7.97±0.011	100.1±0.85

*Average ± standard deviation of six determinations, the t and F- values refer to comparison of the proposed with rerference method.
Theoretical values at 95% confidence limits **t = 2.571 and F = 5.05.**
** Average of five determinations.

Acknowledgements

The authors are grateful to M/s.Veeda CR, Ahmedabad and Siddhartha Academy, Vijayawada, for providing the necessary facilities.

REFERENCES

[1]. S.C.Swetman (Ed), Martindale, The Complete Drug Reference, Pharmaceutical Press, London (UK), 33rd Edition.
[2].British Pharmacopoeia, 2007.
[3].European Pharmacopoeia, 3rd Edition, 1997 and supplement, Council of Europe, Strasburg, 1999.
[4].Physicians Desk Reference, 54th Edition. 2000.
[5].S. Radhofer-Weltea, and P. Dittrich, Journal of Chromatography B: Biomedical Sciences, 30 April 1999.
[6].J. Joseph-Charles, M. Bertucat , Journal of Liquid Chromatography & Related Technologies, Volume 22, Issue 13 July 1999 , 2009 – 2021
[7]. Kiran R. Patil, Vipul P. Rane, Jaiprakash N. Sangshetti and Devanand B. Shinde Journal of Chromatographia, Volume 69, Numbers 9-10 / May, 2009