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Research Article

SPECTROPHOTOMETRIC METHOD FOR THE ESTIMATION OF RANOLAZINE IN BULK AND PHARMACEUTICAL FORMULATIONS

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ABSTRACT

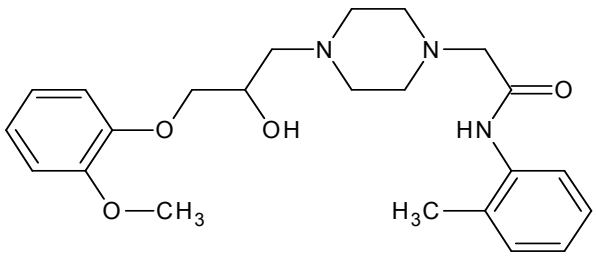
The present study describes a simple, accurate, precise and cost effective colorimetric method has been developed for the quantitative estimation of ranolazine in bulk and pharmaceutical dosage forms. This method is based on the reaction of ranolazine with resorcinol to form orange yellow colored chromogen. The λmax or the absorption maxima of the drug was found to be 447nm. A linear response was observed in the range of 5-25µg/ml with a correlation coefficient of 0.9997. The molar absorptivity, Sandell's sensitivity, quantitation limit and detection limit of the method was found to be precise and accurate. This method can be used for the determination of ranolazine in quality control of formulation without interference of the excipients.

Keywords: Ranolazine, resorcinol, spectroscopy, λmax and colorimetry.

INTRODUCTION

Ranolazine is a antianginal drug and chemically it is a piperazine derivative. Structurally it is N-(2,6-dimethylphenyl)-2-[4-[2-hydroxy-3-(2-methoxyphenoxy) propyl] piperazin-1-yl]acetamide. Ranolazine is believed to have its effects via altering the trans-cellular late sodium current. It is

by altering the intracellular sodium level that ranolazine affects the sodium-dependent calcium channels during myocardial ischemia. Thus, ranolazine indirectly prevents the calcium overload that causes cardiac ischemia. Ranolazine is indicated for the treatment of chronic angina. Ranolazine may be used with betablockers, nitrates, calcium channel blockers, antiplatelet therapy, lipid-lowering therapy, ACE inhibitors, and angiotensin receptor blockers[1-2].



Structure of Ranolazine

There are various methods for determination of ranolazine such as UV- Specrtophotometry[3-5], Liquid chromatography/mass spectrometry (LC/MS)[6-12] and RP-HPLC[13]. Although these techniques are sufficiently sensitive, but they use expensive instrument and time consuming. A simple, sensitive and reproducible Spectrophotometric method has been developed here for the estimation of ranolazine in pure and its pharmaceutical formulations.

MATERIALS AND METHODS

Instrumentation:

A Shimadzu UV/visible double beam spectrophotometer (Model 2450) with 1cm matched quartz cells were used for all the spectral measurements.

Preparation of Standard and Sample Solutions:

About 100 mg of ranolazine was accurately weighed and dissolved in water and volume made up to 100 ml with distilled water (1 mg/ml). The final concentration of ranolazine was made to 100µg/ml with distilled water by dilution. For formulation analysis, twenty tablets of ranolazine each containing 500mg were accurately weighed and finely powdered. An amount equivalent to 100mg of ranolazine was weighed and dilutions were made suitably. Solvents like Hydrochloric acid (0.5% w/v), Sodium nitrite (0.1%w/v), Sodium hydroxide (2% w/v) and Resorcinol (0.5% w/v) were prepared by using distilled water as solvent[14].

ASSAY METHOD:

Aliquots of ranolazine ranging from 0.5 – 2.5 ml (1 ml = 100 µg) were transferred into a series of 10 ml volumetric flasks. To each flask 0.5 ml of Hydrochloric acid (0.5% w/v), 1ml of Sodium nitrite (0.1%w/v), Sodium hydroxide (2% w/v) and 0.5ml of Resorcinol (0.5% w/v) was added. The volumes were made up to the mark with distilled water. The absorbance of the orange yellow colored chromogen was measured at 447 nm against reagent blank. The amount of ranolazine present in the sample was computed from calibration curve.

RESULTS AND DISCUSSION

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 method of least squares was made for the slope (b), intercept (a) and correlation (r) obtained from different concentrations and the results are summarized in Table 1. The percent relative standard deviation and percent range of error (0.05 and 0.01 level of confidence limits) calculated from the eight measurements at ¾ of the upper Beer's law limits of ranolazine are shown in Table 1. The results of analysis of tablet formulations are done at three levels recorded in Table 2. To evaluate the validity and reproducibility of the methods, known amounts of the pure drug were added to the previously analyzed pharmaceutical preparations and the mixtures were analyzed by the proposed method. The result of recovery studies are summarized in Table 2. Interference studies revealed that the common excipients and other additives are usually present in the tablet dosage forms did not interfere at their regularly added levels. The result showed that this method has reasonable precision.The proposed method was found to be simple, sensitive, selective, accurate, precise and economical and can be used for determination of ranolazine.

Table 1: Optical characteristics and precision.

Parameters	Method
λ_{max} (nm)	447
Beer's law limits (µg/ml)	5-25
Molar absorptivity (L/ $mol^{-1}.cm^{-1}$)	4.415×10^3
Sandell's sensitivity (µg /ml/ cm^2/0.001 absorbance unit)	0.0102
Regression equation (Y*)	
Slope (b)	0.0482
Intercept (a)	0.0171
Correlation coefficient (r)	0.9997
% RSD**	1.140
Range of errors**	
Confidence limits with 0.05 level	0.00542
Confidence limits with 0.01 level	0.00725

- **Y = bC + a where C is the concentration of ranolazine in µg/ml and Y is the absorbance at the respective λmax.**
- ** **For eight measurements.**

Table 2: Evaluation of Ranolazine in pharmaceutical dosage forms

Samples (Tablet)	Manufacturer	Labelled amount (mg/Tab)	Amount obtained by(mg) Proposed Method	%Recovery**±S.D
RANCAD	LUPIN	500	498.89	99.78
RANOZEX	SUN PHARMA	500	499.95	99.99
RANOLAZ	TORRENT	500	499.48	99.89

** **Average ± S.D of eight determinations**

CONCLUSION

The proposed method for the spectrophotometric determination of ranolazine samples is simple, rapid and sensitive. The method does not require any heating for the development of colour. The statistical analysis of the results indicates that the methods have good precision and accuracy.

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REFERENCES

1. Beckett AH, Jain SK and Stenlake JB. Practical Pharmaceutical Chemistry. 4th ed. Part-II CBS Publisher and Distributors; p. 275- 300.
2. Sweetman SC. Martindale: The Complete Drug Reference. 36th ed. 2009. p. 1386-1387.
3. Divyesh J Vanparia et al. Spectrophotometric Estimation of Ranolazine in Bulk and Pharmaceutical Dosage Form by UV- Specrtophotometry. International Journal of Chemical and Analytical Science., 2011; 2(9): 1150-1152.

4. Ashish Sharma, Dev Prakash and Sachin kumar Singh. Development and Validation of UV Spectrophotometric Method for the Estimation of Ranolazine in Bulk Drug and Pharmaceutical Formulation. Int.J. ChemTech Res., 2010; 2(4): 1945-1948.
5. Jagdish P Bidada, Indrajit D Gonjari, Chandrakant S Raut and Chetan J Bhutada. Novel Spectrophotometric method for estimation of Ranolazine in bulk and pharmaceutical dosage forms. Der Pharma Chemica., 2011; 3(2):1- 4.
6. Lorenz LJ, High Performance Liquid Chromatography. In, R.E. Schirmer, editor. Modern Methods of Pharmaceutical Analysis, 2nd Ed. Florida, CRC Press: 2000. p. 241.
7. Mermet JM, Otto M, Valcarcel M, Widmer HM, Kellner R. Analytical Chemistry, 2nd Ed. UK; Wiley-VCH: 2004. p.533.
8. Munson JW. High Performance Liquid Chromatography: Theory, Instrumentation, and Pharmaceutical Applications. Pharmaceutical Analysis-Modern Methods, 2nd Ed. Part-B, Mumbai: IMBD Publication: 2001. p.25.
9. Stout TH and Dorsey JG. High Performance Liquid Chromatography. In, L.Ohannesian, A.J. Streeter, editors. Handbook of Pharmaceutical Analysis, NY: Marcel Dekker Inc; 2002. p.127.
10. Chaitman BR et al. Effects of ranolazine with atenolol, amlodipine, or diltiazem on exercise tolerance and angina frequency in patients with severe chronic angina: a randomized controlled trial. 2004. p.309–316.
11. Undrovinas AI, Undrovinas NA and Belardinelli L. Ranolazine inhibits late sodium current in isolated left ventricular myocytes of dogs with heart failure. J Am Coll Cardiol., 2004; 178A.
12. Antzelevitch Cet al. Electrophysiological effects of ranolazine, a novel antianginal agent with antiarrhythmic properties. Circulation: 2004. p. 904–910.
13. Patel RC, Rathod DK, Patel PR and Patel VS. Estimation of Ranolazine Hydrocholide by Spectrophotometric and RP-HPLC in Tablet Dosage Forms. Int J Pharm and App Sci., 2010; 1 (2): 79-83.
14. The United States Pharmacopoeia XIX. The United State Pharmacopoeia Convention, Rockville: 1974.p. 527-528.

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