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A Review on Analytical Method Development and Validation of Ranolazine in Bulk and Tablet Formulation by UV Spectrophotometry

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Abstract:

Ranolazine is in a Class of medications called Anti-anginals. One of the most common causes of chronic angina, a typical sign of cardiovascular illness, is inadequate oxygen delivery from permanent epicardial lesions in the coronary arteries. Ranolazine is used to treat chronic angina. It can be used Concomitantly with β blockers, angiotensin receptor blockers, ACE inhibitors, nitrates, calcium channel blockers, antiplatelet medication, lipid-lowering therapy. Most commonly used solvents are methanol and distilled water. Various parameters are collected including LOD, LOQ, Correlation Coefficient and linearity, absorbance maxima.

Keywords- Ranolazine, UV-Visible Spectroscopy.

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I. INTRODUCTION:

Ranolazine is an Anti-anginal drug. Chemically it is RS-N- (2, 6-dimethylphenyl) - 2 - [4-hydroxy- 3 (2-methoxyphenoxy)-propylpiperazin-1-yl] acetamide.Ranolazine is a piperazine derivative having amide-containing properties, has anti-anginal and potential antineoplastic properties.The chemical formula for it is($C_{24}H_{33}N_3O_4$). The anti-anginal and anti-ischemic actions of ranolazine are independent of reduction in blood pressure or heart rate. It is anticipated that ranolazine will lessen the amount of sodium that enters ischemic myocardium cells by lowering the late sodium current. As a result, it is suggested that ranolazine may indirectly decrease calcium absorption through the sodium/calcium exchanger.

ACE inhibitors, angiotensin receptor blockers, calcium channel blockers, nitrates, antiplatelet medication, lipid-lowering therapy, and beta blockers can all be used with ranolazine.

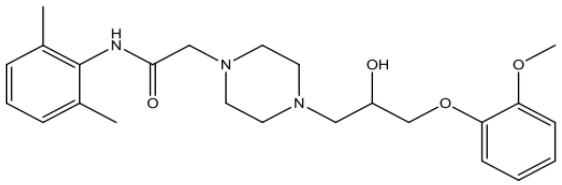

Figure 1: Chemical Structure of Ranolazine

II. LITERATURE REVIEW

S.No.	AUTHOR NAME	JOURNAL NAME	TITLE NAME	ANALYTICALCONDITIONS
01	Ramesh Jet al, 2013[1]	Annals of Pharma Research	Method development and validation for the estimation of ranolazine in bulk and in pharmaceutical dosage form by uv- spectrophotometry	Solvent-Methanol, water λmax -263nm, 282nm Linearity-10-35 mcg/ml Correlation coefficient-0.9992 LOD-0.0072µg/ml LOQ-0.021µg/ml
02	Noon A. A. Kamilet al, 2022[2]	Hacettepe University Journal of the Faculty of Pharmacy	Derivative Spectrophotometric Methods for the Analysis and Stability Studies of Ranolazine in Bulk and Dosage Forms	Solvent- Methanol λmax -283nm, 278nm LOD- 24.0,17.8 µg/ml LOQ- 73.0,53.6 µg/ml
03	Jayprakash B. Ugale et al, 2015[3]	World Journal of Pharmaceutical Research	Development and validation of UV-Spectrophotometric area under curve method for	Solvent-Methanol, water λmax -261 to 281 nm Linearity-75-200µg/ml.

			quantitative estimation of ranolazine in API and tablet formulation	LOD- 10.77 µg/ml LOQ- 32.63 µg/ml Correlation coefficient- 0.998
04	Patil Shubham Pet al, 2018[4]	American Journal of PharmTech Research	Development and Validation of UV Spectroscopic Method for Estimation of Ranolazine in Tablet Dosage Form	Solvent-Methanol λmax-235 nm Linearity-2-12 µg/mlCorrelation coefficient-0.999 Melting point- 120-122˚C
05	Ashish Sharmaet al, 2010[5]	International Journal of ChemTech Research	Development and Validation of UV Spectrophotometric Method for the Estimation of Ranolazine in Bulk Drug and Pharmaceutical Formulation	Solvent-Methanol λmax-272 nm Linearity-10-100 µg / ml LOD- 0.27µg / ml LOQ- 0.82µg / ml
06	Ramanaiah Ganjiet al, 2012[6]	American Journal of PharmTech Research	Development and Validation of UV Spectroscopy method for Estimation of Ranolazine in bulk and its Pharmaceutical Formulation	Solvent-Methanol, distilled water, Acetonitrile λmax -230nm Linearity-12-40µg/ml Correlation coefficient-0.999 %Recovery-100.2%
07	DVS Roopa Sirisha Doppaet al, 2019[7]	Research Journal of Pharmacy and Technology	Development and Validation of UV Spectroscopic Method for the Determination of Ranolazine in Bulk and Formulation	Solvent-Methanol, distilled water, orthophosphoric acid λ-max- 271nm Linearity-10-100µg/ml LOD-0.807 µg/ml LOQ-2.4460µg/ml Correlation coefficient-0.999 %Recovery-97.25-97.75%
08	Vishakha D. Patel et al, 2016[8]	Asian Journal of Pharmaceutical Analysis	Second Derivative Spectroscopic Method for Simultaneous estimation of Amiodarone Hydrochloride and Ranolazine in synthetic mixture	Solvent-Synthetic mixture λmax - 249 nm Linearity- 10-200 µg/ml LOD-0.271µg/ml LOQ-0.823µg/ml Correlation coefficient-0.9996
09	Vishal Rathod et al, 2023[9]	Journal of Emerging Technologies and Innovative Research	Development and validation of indicating instrumental method for estimation of ranolazine in bulk and tablet dosage form	Solvent-Methanol λmax-274nm Linearity- 10-60 µg/ml LOD-0.68µg/ml LOQ-2.15µg/ml Correlation coefficient-0.999
10	Magesh AR et al, 2021[10]	DerPharmaChemica	Development of Visible Spectrophotometric Methods for the Determination	Solvent-Methanol λmax-432nm Linearity range-25-125µg/ml LOD - 0.81 µg/ml LOQ- 2.23 µg/ml Correlation coefficient-0.9996
11	Krupa Vyas et al, 2022[11]	Journal of Drug Delivery & Therapeutics	Development of a UV visible spectrophotometric method for simultaneous estimation of Ranolazine and Metoprolol	Solvent-0.1NHCl λmax- 272nm Linearity range-7.5-37.5ppm LOD- 0.17069ppm LOQ- 0.51724ppm
12	Jitesha Patel et al, 2020[12]	The Pharma Innovation Journal	Novel UV-spectrophotometric & RP-HPLC method development and validation of	Solvent-Methanol λmax-237nm LOD- 0.09 µg/mL

			simultaneous estimation of ranolazine and metformin HCL: A statistical analysis	LOQ- 0.28 µg/mL Accuracy- 98.41% to 100.02% Correlation coefficient-0.989
13	Rakesh Kumar Singh et al, 2011[13]	International Journal of Pharmaceutical Sciences and Research	Nanodrop spectrophotometric method development and validation for estimation of ranolazine in their bulk	Solvent- Distilled water λmax-272nm Correlation coefficient-0.9995 Linearity range-12.5-2000ppm % RSD less than 2
14	Naveen Kumar GS et al, 2014[14]	Unique Research Journal of Chemistry	Spectrophotometric Method For The Estimation Of Ranolazine In Bulk AndPharmaceutical Formulations	Solvent- Distilled water λmax- 447nm Correlation coefficient-0.9997 Linearity range- 5-25µg/ml
15	Rahul H. Khiste et al, 2019[15]	International Journal of Pharmaceutical & Biological Archives	Simultaneous Equation and Area Under the Curve Spectrophotometric Methods for Estimation of Ranolazine Hydrochloride Presence of its Base-induced Degradation Product: A Comparative Study	Solvent-Methanol λmax- 249nm, 272nm Linearity range- 5-30µg/ml LOD- 0.246µg/ml, 0.358µg/ml LOQ- 0.9256µg/ml, 0.974µg/ml

CONCLUSION

According to this review spectroscopic and chromatographic methods for Ranolazine are available for single and combination analysis.Methanol is the typical solvent used in the majority of spectroscopic techniques.The majority of the techniques used were UV absorbance detection and RP-HPLC because they provide the highest levels of precision, repeatability, reliability, and also it issimple, rapid and robust quantitative analytical method.

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