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UV spectrophotometric method for simultaneous estimation of rabeprazole sodium and levosulpiride in bulk and tablet dosage form

Yoganand B. Deulgaonkar*, Jigar A. Patel, Moreshwar P. Mahajan and Sanjay D. Sawant

Department of Pharmaceutical Chemistry, Smt. Kashibai Navale College of Pharmacy Kondhwa (bk.) Pune

ABSTRACT

A simple, precise and reproducible UV spectrophotometric method, Q-value analysis method, have been developed and validated for the simultaneous estimation of Rabeprazole sodium and Levosulpiride. The method is based on the measurement of absorbance of Rabeprazole sodium and Levosulpiride at 260 nm which is the isobestic point and 284 nm the λ_{max} of Rabeprazole Sodium. The method obeyed Beer's law in the concentration range of 3-18 $\mu\text{g/ml}$ for Rabeprazole sodium and 15-90 $\mu\text{g/ml}$ for Levosulpiride. The results of analysis have been validated statistically and recovery studies confirmed the accuracy of the proposed method. The method was successfully applied to the determination of these drugs in pharmaceutical dosage form.

Keywords: Rabeprazole sodium, Levosulpiride, Q-Analysis method, UV Spectrophotometry.

INTRODUCTION

Rabeprazole sodium (RABE) is a potent proton pump inhibitor that suppresses gastric acid secretion by specific inhibition of the gastric H^+ , K^+ -ATPase enzyme system and thereby suppresses gastric acid secretion. It is used in the treatment of gastroesophageal reflux disorder (GERD) and duodenal ulcer. Rabeprazole sodium is chemically known as 2-[[[4-(3-methoxypropoxy)-3-methyl-2-pyridinyl]-methyl] sulfonic]-1H-benzimidazole sodium salt shown in fig-1. ^[1, 2]

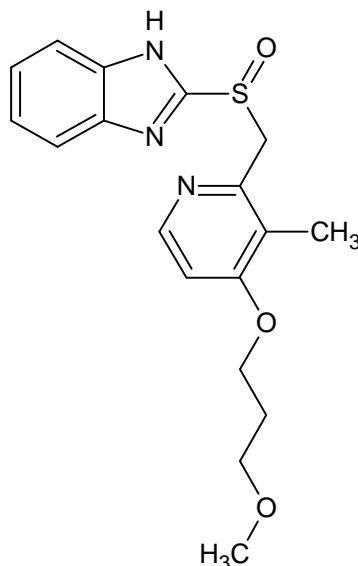


Fig-1: Chemical structure of Rabeprazole sodium

Levosulpiride

Levosulpiride (LEVO) is a Dopamine D2 receptor antagonist. It is an antipsychotic and prokinetic agent. Levosulpiride is also claimed to have mood elevating properties. Levosulpiride is used in the treatment of psychoses, particularly negative symptoms of schizophrenia, anxiety disorders, dysthymia, vertigo, dyspepsia, irritable bowel syndrome and premature ejaculation. It is the (*S*)-enantiomer of sulpiride. Compared with racemic and dextro forms, the levo form of sulpiride has greater anti dopaminergic activity, anti-emetic and antidyspeptic effects and lower acute toxicity. It is chemically known as *n*-{[(2*s*)-1-ethylpyrrolidin-2-yl] methyl}-2-methoxy-5-sulfamoyl benzamide shown in fig-2.^[5,6]

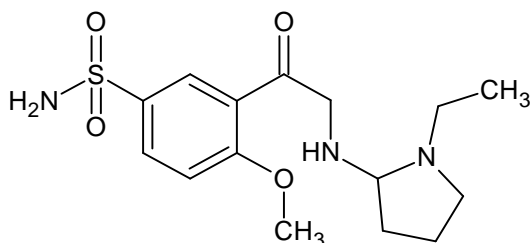


Fig-2 Chemical structure of Levosulpiride

In view of the need for a suitable method for routine analysis in combined formulations, attempts are being made to develop simple, precise and accurate analytical methods for simultaneous estimation of title ingredients and extend it for their determination in formulation.

MATERIALS AND METHODS

Materials

Levosulpiride (LEVO) and Rabeprazole (RABE) were supplied as a gift sample by Ajantha Pharma Mumbai and Hetero Drugs Limited Hyderabad respectively. Rabekind Plus, a commercial formulation containing a combination of RABE (20 mg) and LEVO (75 mg) manufactured by Qualite Pharmaceuticals, Dehradun was purchased from local firms. All other chemicals used were of pharmaceutical or analytical grade.

Instrumentation

A Jasco double beam UV-visible spectrophotometer, Model: V-630, with a fixed bandwidth (1.5 nm) and 1-cm quartz cell was used for spectral and absorbance measurements. In addition, electronic balance, micropipette and sonicator were used in this study.

Procedure

Preparation of standard stock solution

Standard stock solutions of Rabeprazole sodium and Levosulpiride were prepared by dissolving 25 mg of drug in 25 ml of methanol to get standard stock solution of 1000 µg/ml. This solution was further diluted to get standard solution of concentration 100 µg/ml of RABE and LEVO.

Determination of isoabsorptive point and wavelength of maximum absorbance

The working standard stock solutions of RABE and LEVO were scanned in the range of 200 to 400 nm against methanol as a blank. Iso-absorptive point was found at 260 nm.

Preparation of Sample solution from tablet dosage form

For analysis of both RABE and LEVO in tablets, twenty tablets were accurately weighed and average weight was calculated. Tablets were finely powdered and mixed thoroughly. Quantity of tablet powder equivalent to 20 mg of RABE and 75 mg of LEVO was weighed accurately, dissolved in 100 ml methanol and sonicated for 20 min. The solution was filtered through Whatman filter paper (No. 41) and transferred to 100 ml volumetric flask and from that solution 1 ml was transferred to 10 ml volumetric flask and make up the volume with methanol. The aliquot portion of filtrate was further diluted with methanol to get final concentration of about 4 µg/ml for RABE and 15 µg/ml of LEVO.

Calibration curve (Linearity)

A calibration curve was plotted over a concentration range of 3-18 µg/ml for RABE and 15-90 µg/ml for LEVO. Stock solutions for spectrophotometric measurements were prepared by dissolving RABE and LEVO in methanol to obtain concentration of 1 mg/ml for each compound. For calibration, series of above solutions were prepared containing RABE 3-18 µg/ml LEVO 15-90 µg/ml by diluting the stock standard solution with methanol in standard

volumetric flasks (10ml). Calibration curves were constructed for RABE and LEVO by plotting absorbance versus concentrations at both wavelengths.

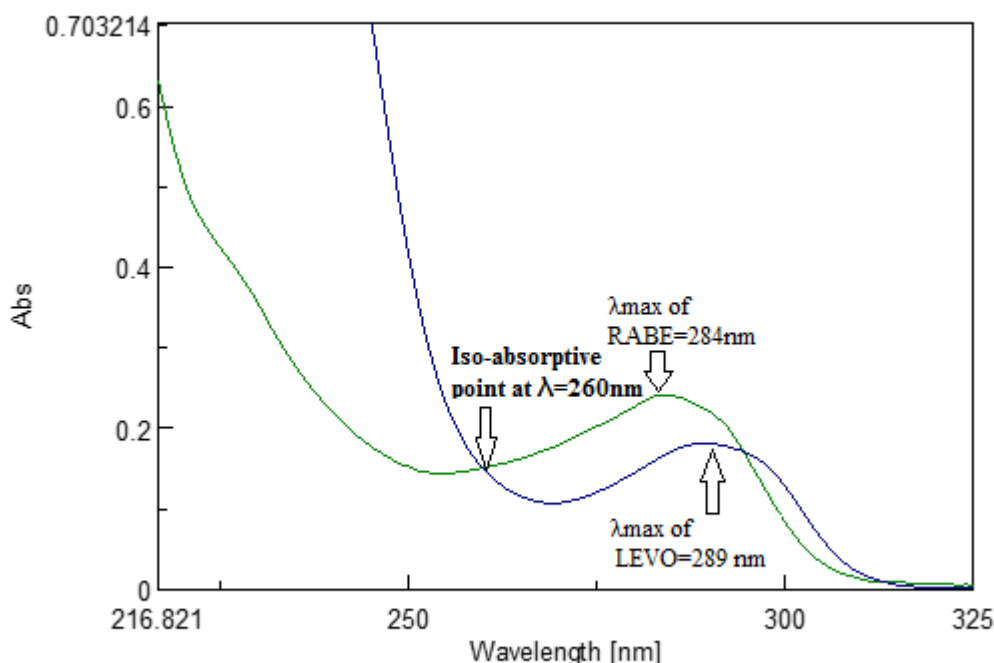


Fig. 3: It shows the overlay spectra of RABE and LEVO showing isoabsorptive point at 260 nm

Table 1: It shows linear regression data for calibration curves.

Parameters	Rabeprazole sodium	Levosulpiride
Linearity range (µg/ml)	3-18	15-90
r^2	0.9995	0.9996
Slope	0.0588	0.037
Intercept	0.0181	0.0002

Q Value Analysis Method

From the overlain spectrum of RABE and LEVO which is shown in above Fig.3, the wavelengths selected for analysis are 260 nm (isobestic point) and 284 nm (λ_{max} of Rabeprazole sodium). The absorbance of the standard and sample solutions was measured. The absorptivity values for both standard drugs at the selected wavelengths were employed for determination of Q values. The concentrations of drugs in sample solution were determined by using the following formula. [11]

$$C_X = \frac{(Q_M - Q_Y) \times A_1}{(Q_X - Q_Y) \times aX_1} \quad \text{AND} \quad C_Y = \frac{A_1}{aX_1 - C_X}$$

Where, A_1 & A_2 are the absorbance of the mixture at 260 nm & 284 nm respectively; aX_1 and aY_1 are absorptivity of RABE and LEVO respectively at 260 nm; aX_2 and aY_2 are absorptivity of RABE and LEVO respectively at 284 nm; $Q_M = A_2/A_1$, $Q_X = aX_2/aX_1$ and $Q_Y = aY_2/aY_1$.

Table 2: It shows statistical evaluation of marketed formulation.

Drug	Label claim (mg)	Amount found (mg)	% Label Claim
Rabeprazole Sodium	20 mg	19.7 mg	98.50
Levosulpiride	75 mg	74.2 mg	99.06

Validation of the Developed Method

The methods were validated with respect to linearity, precision and accuracy.

Linearity

The linearity of an analytical method is its ability to elicit test results that are directly or by a well-defined mathematical transformation proportional to the concentration of analyte in samples within a given range. The range of analytical method is the interval between upper and lower level of analyte including levels that have been demonstrated to be determining with precision and accuracy using the method. The linear response of RABE and LEVO were determined by analysing five independent levels of the calibration curve in the range of 3-18 µg/ml for RABE and 15-90 µg/ml for LEVO. Result should be expressed in terms of Correlation co-efficient.

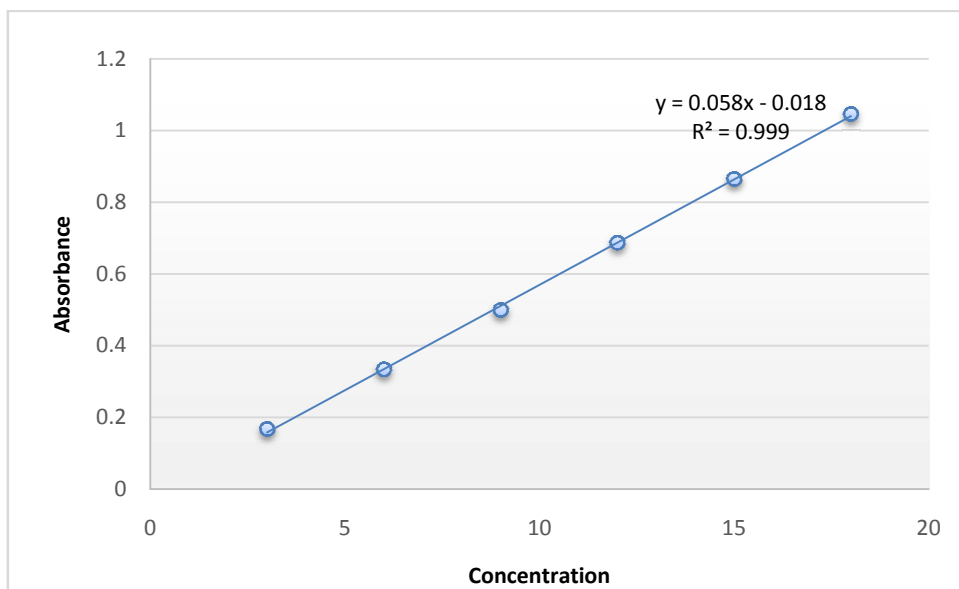


Fig. 3: It shows calibration curve of RABE

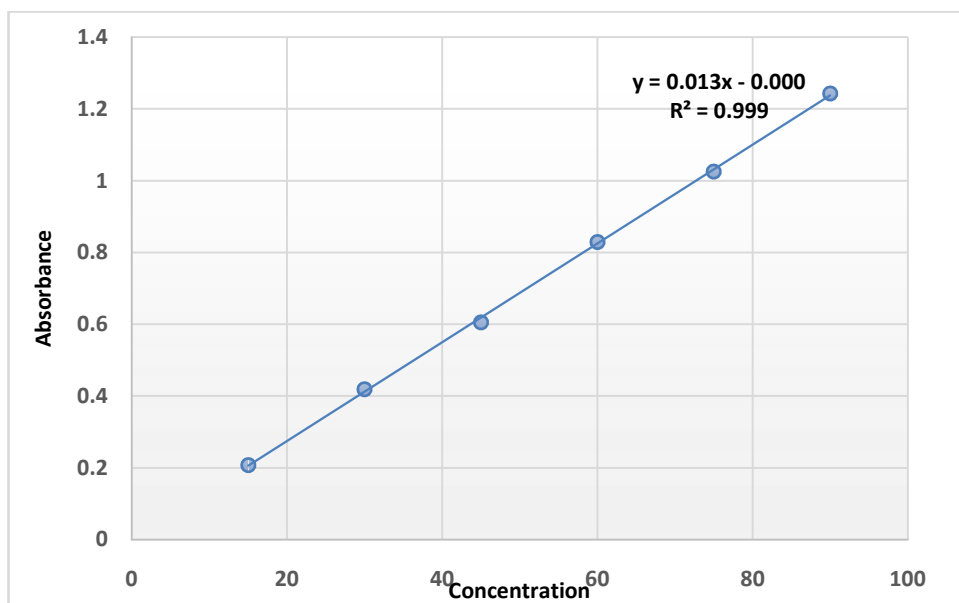


Fig. 4: It shows calibration curve of LEVO

Precision

The reproducibility of the proposed method was determined by performing tablet assay at different time intervals (morning, afternoon and evening) on same day (Intra-day assay precision) and on three different days (Inter-day precision). Result of intra-day and inter-day precision is expressed in % RSD.

Table 3: It shows result of Intraday and Interday precision

Drug	% RSD (intra day)	% RSD (inter day)
Rabeprazole sodium	0.4896	0.8908
Levosulpiride	0.47027	0.7490

Accuracy (% Recovery)

Accuracy of an analysis is determined by systemic error involved. It is defined as closeness of agreement between the actual (true) value and analytical value and obtained by applying test method for a number of times. Accuracy may often be expressed as % Recovery by the assay of added amount of analyte. It is a measure of the exactness of the analytical method. Recovery studies were carried out for both the methods by spiking standard drug in the powdered formulations 80%, 100%, 120% amount of each dosage content as per ICH guidelines.

Table 4: It shows result of Recovery study

Recovery Level (%)	Drug	Conc. of drug ($\mu\text{g/ml}$)		% Recovery
		Drug Taken	Std. drug added	
80	RABE	4	3.2	99.65
100		4	4.0	99.47
120		4	4.8	99.48
80	LEVO	15	12	99.32
100		15	15	100.30
120		15	18	99.80

RESULTS AND DISCUSSION

In this method, the standard stock solutions of RABE and LEVO were prepared in methanol. The calibration curves for RABE (3-18 $\mu\text{g/ml}$) and LEVO (15-90 $\mu\text{g/ml}$) were plotted and molar absorptivity for both the drugs were calculated at both the wavelengths of 284 nm (λ_{max} of RABE) and 260 nm (isoabsorptive point). It is evident from the spectra of RABE and LEVO that these drugs obey the Lambert-Beer's law at all the wavelengths. The regression characteristics are reported in Table no.1. The assay was performed by measuring absorbance of the sample solutions at respective wavelengths for the formulation calculating Q-values for the drugs and then putting these values in formula and determined content of each drug in formulation. The result of assay is reported in Table no.2. Recovery studies were carried out by spiking standard drug in the powdered formulations in 80%, 100%, 120% amount of each drug as per ICH guidelines. The results of the recovery analysis are reported in Table 4 which proved the good accuracy of the proposed methods.

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REFERENCES

- [1] A.S. Birajdar, N.M. Subramania, S. Bojraj *Pelagia Research Library*, 1 (3):2010, 69-78.
- [2] D. Sahu, Y. P. Agrawal, Sabarwal N., A. Jain, A. K. Gupta *Asian Journal of Biochemical and Pharmaceutical Research* Issue 3 (Vol. 1) 2011, 66-75.
- [3] R. G. Baldha., V. B. Patel, Mayank Bapna *International Journal of PharmTech Research* Vol.2, No.2, April-June 2010, 1563-1568.
- [4] S. Shilpa, T. Sai Annapurneswari, V. Jayathirtha Rao, B. Rajesh, P. Venkateshwarao, B. China Raju *of Pharmacy Research*, 5(10), 2012, 5010-5013.
- [5] D. D. Brahmabhatt, M. B. Patel, J. C. Patel *International Journal of ChemTech Research* Vol.4, July-Sept 2012, 945-950.
- [6] Y. P. Agrawal, S. P. Gautam, A. Verma, M. Y. Agrawal, A. K. Gupta *Pelagia Research Library* 2012(3):337-342.
- [7] S. Manjunath, V. Chouhan, S. Sandeep *International Journal of Pharmacy and Pharmaceutical Sciences* Vol 3, Issue 2, 2011, 135-137.
- [8] M. S. Jain, Y. S. Agrawal, R. B. Chavhan, M. M., S. D. Barhate *Asian Journal of Pharmaceutical Analysis*; Vol. 2: Issue 4, 2012, 106-109.
- [9] R. L. Sawant, R. Ahmed, Ramdin, S. Supriya and Darade. R. Sheetal *Der Pharma Chemica*, 4 (2), 2012, 714-719.
- [10] S. U. Kalure, R. B. Kulkarni, G. P. Somwanshi *Der Pharma Chemica*, 4(4), 2012, 1517-1521.

- [11] ICH Harmonized Tripartite Guideline Validation of Analytical Procedures: Text and Methodology, Q2(R1) November, **2005**, 1-17.
- [12] Beckett, A.H. and Stenlake, J.B., In; Practical Pharmaceutical Chemistry, 4th Edn., Part 2, CBS Publishers and Distributors, New Delhi, **2002**, 275-278, 281-300.
- [13] Skoog, D.A., West, D.M., Holler, F.J. and Crouch, S.R., In; Fundamentals of Analytical Chemistry, 5th Edn. Thomson Brooks/Cole, 971-995.
- [14] Kalsi P. S., Spectroscopy of Organic Compounds. 6th edition, New Delhi, New Age International Publishers, **2007**, 7-10