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Spectrophotometric estimation of Blonanserin in pure drug and pharmaceutical formulation

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ABSTRACT

A simple, sensitive and accurate spectrophotometric method was developed in ultraviolet region for the estimation of blonanserin in pure drug and pharmaceutical formulation. Linear response obtained was in the concentration range of 2-10 µg/ml with correlation coefficient of 0.9999 in solvent. Excellent recovery proved that the method was sufficiently accurate. There is no interference from any common pharmaceutical additives and diluents. Results of the analysis were validated by recovery studies according to ICH Q2B guidelines.

Keywords: Blonanserin; Spectrophotometry; Validation; Pharmaceutical formulations.

INTRODUCTION

Blonanserin (2-(4-ethyl-l-piperazinyl)-4-(4-fluorophenyl)-5, 6, 7, 8, 9, 10 hexahydrocyclo-octa[b]-pyridine ;) is a novel antipsychotic agent, having dopamine D_2 and serotonin 5-HT_{2A} receptor antagonist properties [1-6]. It is one of the second- generation antipsychotic agents, together with risperidone and olanzapine, it is effective in the treatment of both positive and negative symptoms of schizophrenia without extra-pyramidal symtoms, but has original properties of affinity higher for the dopamine D_2 receptor than for the serotonin 5-HT_{2A} receptor[1-4,6,7]. On the other hand, blonanserin is much less potent in adrenergic-α_1, histamine H_1 and muscarinic M_1 antagonist activities [6]. Such a pharmacological profile shows that blonanserin is more specific to the dopamine D_2 and serotonin 5-HT_{2A} receptors with fewer side effects; its excellent effects on schizophrenia have been reported in many reports [7-10]. There is a possibility that this drug gain popularity for treatment of schizophrenia throughout the world.
Blonanserin is not yet official in I.P., B.P. and U.S.P. Extensive survey revealed that not a single UV method is however reported for blonanserin. So the need was felt to develop simple, economical, rapid, precise and accurate method to analyze the drug by UV method.

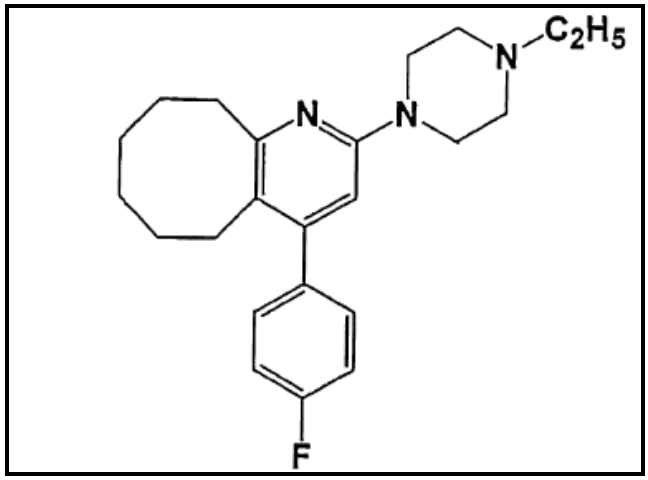

Figure 1: Chemical structure of Blonanserin

EXPERIMENTAL SECTION

Blonanserin working standard (purity, 99.80%) used from Cadila Healthcare Ltd., Ahmedabad, India. Blonanserin tablets were obtained from Cadila Healthcare Ltd., Ahmedabad, India. Each tablet was labeled contain 4 mg of Blonanserin. All other reagents used were of analytical reagent grade supplied by Spectrochem, India. Spectral and absorbance measurements were made on a UV-Visible spectrophotometer 1700 Shimadzu Limited with 10mm matched pair of quartz cell and spectral band width of ±2nm.

Selection of solvent

The ideal property of a solvent should be that the drug should be completely soluble in the solvent used. The drug should be stable in the solvent used and should be economical and volatile. After suitable literature survey, practical experience and taking above factors into consideration the suitable solvents selected was methanol.

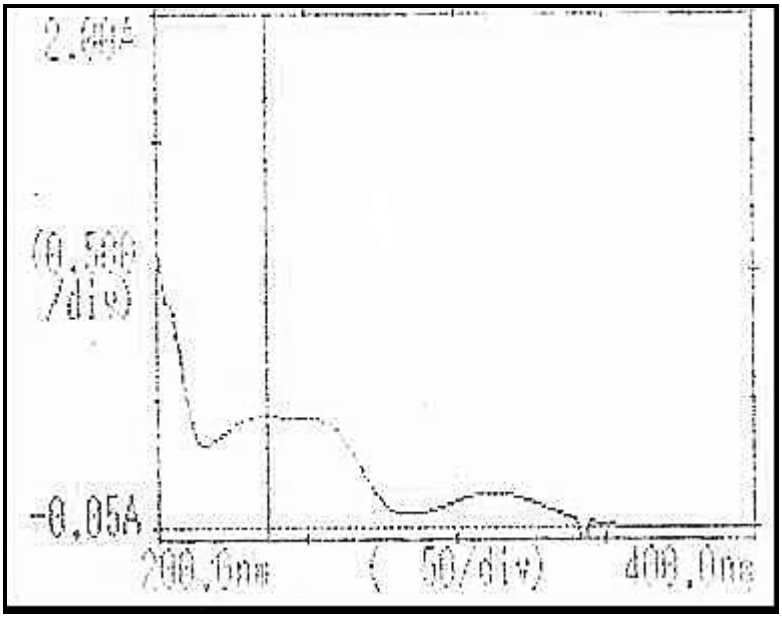

Figure 2: Spectrum of Blonanserin at wavelength 200 to 400 nm

Selection of Method and Wavelength

For estimation of Blonanserin single-wavelength spectrophotometric method employing 237nm analytical wavelength was used, spectra shown in Fig. 2

Standard solutions and calibration curve

Accurately weighed 10mg of Blonanserin is transferred into a 100ml volumetric flask and dissolved in 30ml of methanol. It was then sonicated for 10 minutes, and made up to the mark with methanol to give a stock solution having 100 µg/ml concentration. For calibration curve, serial dilutions were made for Blonanserin in the range of 2, 4, 6, 8, and 10µg/ml concentrations were prepared by diluting the stock solution with methanol. The absorbance values of above solutions were measured in the wavelength at λ max 237nm against methanol as blank and calibration curve was prepared. It obeyed beer's law in these concentration ranges.

Sample preparation for tablet analysis

To determine the content of Blonanserin in conventional tablets (label claim: 4mg Blonanserin per tablet), twenty tablets were weighed, their mean weight was determined and they were finely powdered and powder equivalent to 10 mg of Blonanserin was weighed and transferred into a 10 ml volumetric flask containing 10 ml methanol, sonicated for 10 min and the resulting sample solution was then filtered through Whatmann filter paper (No. 41). The filtrate was further diluted to obtain the final concentration of 100µg/ml. Appropriate dilutions of Blonanserin were scanned over the range of 400-200 nm and the absorbance at wavelength 237nm was measured. From calibration curve the final drug concentration in tablet was calculated.

Method Validation

Method validation was performed in terms of specificity and selectivity, precision and accuracy, linearity and stability ICH Q2B, 1996[11].

Precision and Accuracy

Accuracy of analysis was determined by performing recovery studies by spiking different concentrations of pure drug in the pre analyzed tablet samples within the analytical concentration range of the proposed method at three different set at level of 50%, 100% and 150%.

Precision was calculated for inter day and for intraday. The data obtained shows that method is sufficiently precise. Precision is calculated as % Relative Standard Deviation.

Linearity and Stability

The response for Blonanserin was linear in the concentration range of 2- 10µg/ml with coefficient of correlation $r^2 = 0.9999$ for pure drug. Problems of stability are usually encountered with these compounds.

RESULTS AND DISCUSSION

Standard calibration curve for Blonanserin, covering the range 2-10µg/ml, prepared by serial dilution with methanol for pure drug and tablet formulation were developed and validated. The procedure was adopted as per designed protocol, based on ICH Q2B guidelines. The calibration curve was obtained by plotting absorbance vs analyte concentration. The slope and intercept of the calibration line was determined by linear regression.

Selectivity and specificity

The drug Blonanserin in the formulation was well identified under this condition. No interference observed in nine different samples of Blonanserin. Fig. 3 and 4 showed a linear relationship between the absorbance and the concentration, with correlation coefficient and percentage estimated with standard deviation of 0.9999, 99.75 ± 1.20, respectively. The results are shown in Table 1 and 2.

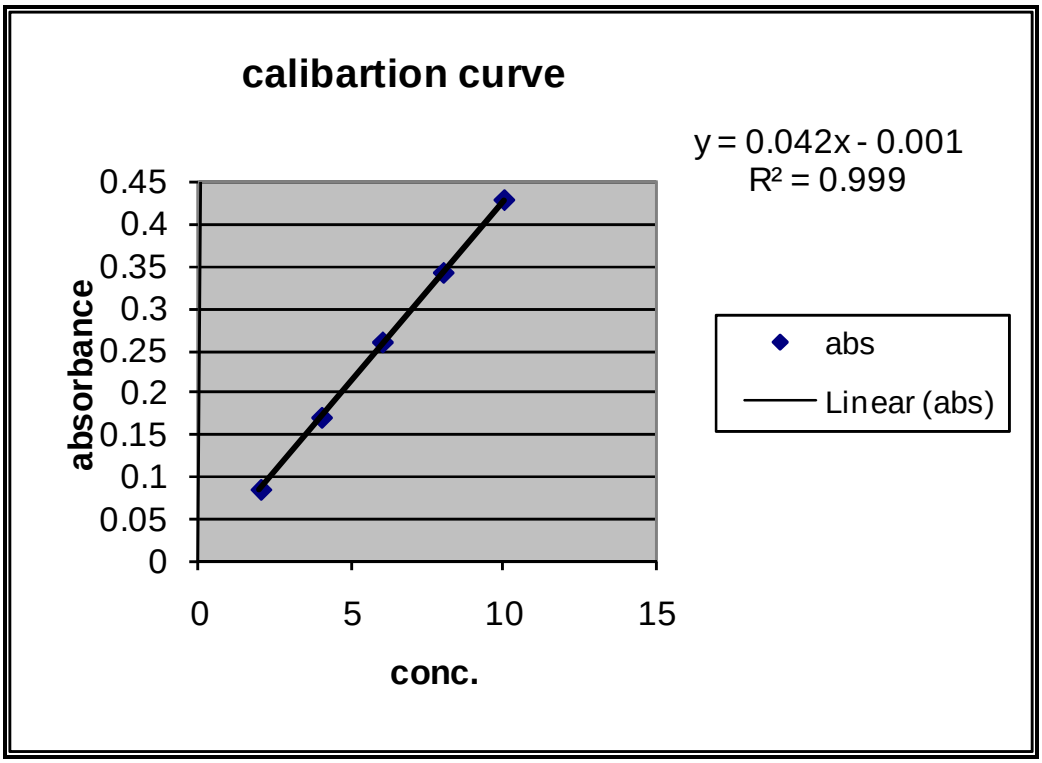

Figure 3: Calibration curve of Blonanserin showing linearity relationship

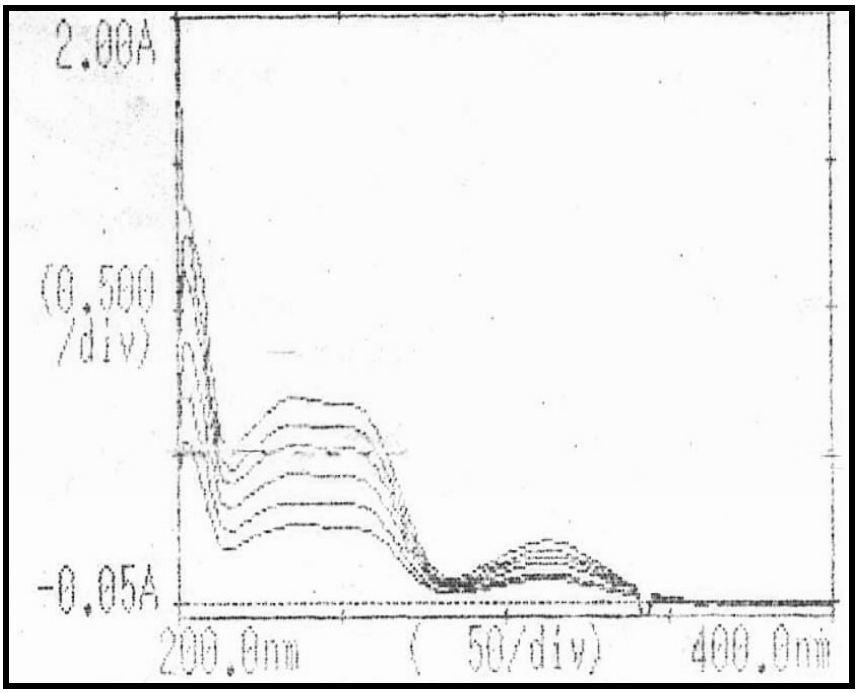

Figure 4: Overlain spectra of Blonanserin in methanol

Table 1: Linearity regression data for Blonanserin

Parameters	Value of Blonanserin
Beer's law limit (µg/ml)	2-10 (µg/ml)
Correlation coefficient	0.9999
Regression equation (Y*)	Abc=A+B*C
Slope(B)	0.0427
Intercept (A)	-0.001

Table 2: Results of analysis of laboratory samples

Label claim (mg/tab)	% Concentration estimated* (Mean ± % R.S.D.)
4 mg/tab	99.75 ± 1.20

Average of nine determinations; R.S.D., Relative Standard Deviation

Recovery

As shown in Table 3 excellent recoveries were made at each added concentration.

Table 3: Recovery data for Blonanserin

Level added (%)	Recovery (%)*	RSD %
50	98.88	0.85
100	100.43	1.15
150	99.67	1.22

** Mean of three determinations*

Precision

Precision evaluated through intraday and inter day of the pure drug from solvent are presented in Tables 4 and 5, respectively.

Table 4: Results of intraday precision of Blonanserin

Parameter	% Drug estimated* (Mean ± %R.S.D.)		
	6 µg/ml	8 µg/ml	10 µg/ml
Morning	98.30±0.68	99.90±0.48	99.45±0.17
Afternoon	99.92±0.83	99.62±0.23	101.02±0.61
Evening	99.62±1.20	100.02±1.32	99.22±1.03

**Average of nine determinations; R. S. D., Relative Standard Deviation*

Table 5: Results of interday precision of Blonanserin

Parameter	% Drug estimated* (Mean ± %R.S.D.)		
	6 µg/ml	8 µg/ml	10 µg/ml
Day 1	100.30±1.08	99.90±1.18	99.45±0.99
Day 2	101.02±1.33	101.02±0.96	98.02±0.98
Day 3	100.72±0.62	99.72±0.92	99.62±0.73

**Average of nine determinations; R. S. D., Relative Standard Deviation*

Limit of detection (LOD) and Limit of quantification (LOQ)

The LOD determined as the amount of drug and LOQ was determined as the lowest concentration for drug shown in Table 6.

Table 6: Limit of detection and limit of quantitation for drug in solvent

LOD (µg/ml)	LOQ (µg/ml)
10.46	31.70

CONCLUSION

A spectrophotometric method for quantifying Blonanserin in tablet has been developed and validated. The method is selective, precise, accurate and linear over the concentration range studied. The method is simple and suitable for the determination of Blonanserin in formulation without interference from excipients or from common degradation products, suggesting its application in IPQC and pharmacokinetic studies.

REFERENCES

[1] H. Oka, Y. Noda, Y. Ochi K. Furukawa, K. Une, S. Kurumiya, K. Hino and T. Karasawa, *J. Pharmacol. Exp. Ther.*, **1993**, *264*, 158.
[2] Y. Noda, S. Kurumiya, Y. Miura, and M. Oka, *J. Pharmacol. Exp. Ther*., **1993**, *265*, 745.
[3] C. E. Heading, *Drugs*, **1998**, *1*, 813.
[4] T. Nagai, Y. Noda, T. Une, K. Furukawa, H. Furukawa, Q. M. Kan, and T. Nabeshima, *Neuroreport*, **2003**, *14*, 269.
[5] T. Ochi, M. Sakamoto, A. Minamida, K. Suzuki, T. Ueda, T. Une, H. Toda, K. Matsumoto, and Y. Terauchi, *Bioorg. Med. Chem. Lett*., **2005**, *15*, 1055.
[6] T. Ishibashi, H. Nishikawa, T. Une, and H. Nakamura, *Folia Pharmacol. Jpn*, **2008**, *132*, 351.
[7] E. D. Deeks and G. M. Keating, *CNS Drugs*, **2010**, *24*, 65.
[8] R. Kumagai and Y. Ichimiya, *Psychiatry Clin. Neurosci*., **2009**, *63*, 593.
[9] E. Garcia, M. Robert, F. Peris, H. Nakamura, N. Sato, and Y. Terazawa, *CNS Drugs*, **2009**, *23*, 615.
[10] T. Furuse and K. Hashimoto, *Ann. Gen. Psychiat*., **2010**, *9*, 17.
[11] International Conference on the Harmonization of Technical Requirements for the Registration Of Pharmaceutical for Human Use (ICH) Q2B **1996**. Validation of Analytical Procedures, Methodology.