Section A-Research paper

ESTIMATION OF ZIPRASIDONE FROM ITS FORMULATION BY HYDROTROPIC TECHNIQUES

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Abstract

A new simple, rapid, sensitive and precise spectrophotometric method in ultraviolet region has been developed for determination of Ziprasidone in bulk and in pharmaceutical formulations. Ziprasidone exhibited maximum absorbance at 240 nm. Beer's law was found to be obeyed in the concentration range 1-25 µg/ml. The proposed method is sensitive, accurate, reproducible and useful for the routine estimation of Ziprasidone in capsule.

Keywords: Spectrophotometer, Ziprasidone, Marketed formulation, Hydrotropic technique

Introduction

Ziprasidone is a new antipsychotic drug and chemically 5-[2-[4-(1, 2benzisothiazol-3-yl)-1-piprazinyl]-6-chloro-1, 3dihydro-2H-indole-2-one or 5-[2-(4-(1, 2-benzisothiazol-3-yl) piprazinayl) ethyl]-6-chloroxindole; $C_{21}H_{21}ClN_4OS$. It is used for the treatment of schizoprenia[1,2]. Literature survey revealed a HPLC method for analysis of Ziprasidone[3-6]. Ziprasidone has a high affinity for dopamine, serotonin, and alpha-adrenergic receptors and a medium affinity for histaminic receptors. Ziprasidone is somewhat unique among the "atypicals" in that it also displays some inhibition of synaptic reuptake of serotonin and norepinephrine, although the clinical significance of this is unknown. The mechanism of action of Ziprasidone is unknown, however it is theorized that its antipsychotic activity is mediated primarily by antagonism at dopamine receptors, specifically D2. Serotonin antagonism may also play a role in the effectiveness of Ziprasidone. In the present investigation an attempt was made to develop a simple and economical spectrophotometric method with greater precision, accuracy and sensitivity for the analysis of Ziprasidone (a poorly water-soluble drug) in capsule formulation.

Material and Methods

UV-Visible double beam spectrophotometer, ThermoFisher model-1800 having spectral bandwidth 5nm and of wavelength accuracy ±1nm, with 1cm quartz cells was used. Pure sample of Ziprasidone was gifted from Sun pharmaceutical; Bombay and 10 M urea was selected as solvent and hydrotropic solubilizing agent. Ziprasidone capsules were procured from local pharmacy.

Standard preparation[7-9]

About 10 mg of Ziprasidone was accurately weighed and dissolved in 10 M of urea to give stock solution of (100 µg/ml). Different aliquots taken from stock standard in a series of 10ml volumetric flask volume was made up with solvent to get concentration of range of 1-25µg/ml. One of the above solutions was scanned in UV range using urea as a blank and wavelength of maximum absorption was found to about 240nm. The absorption solutions of different concentration were measured at 240nm using urea as a blank. Calibration curve was plotted between absorbance Vs concentration. Amount of Ziprasidone in sample solution was calculated using regression equation. Optical characteristics such as λ max, Beers law, sandells sensitivity, molar extinction coefficient, regression equation, slope and intercept are presented in Table1 & 2.

Table 1: Optimum parameters and statistical data of the regression Equation for the standard Ziprasidone precision & accuracy data.

S. No.	Parameter	Value
1	λmax	241
2	Beer's law limit (µg/ml)	1 to 24
5	Correlation coefficient(R)	0.9989
6	Regression equation	y = 0.954x-0.132
7	Intercept (a)	-0.1312
8	Slope (b)	0.964

Table 2:-Estimation of Ziprasidone as standard drug

Ziprasidone	Amount Taken (mg)	Amount found (mg) ± S.D.	Recovery studies Amount added	Amount found	Recovery %
Batch A	20	19.61 ± 0.21	2.5	22.48	99.77
Batch B	20	19.75 ± 0.33	5.0	24.85	99.82
Batch C	20	19.82 ± 0.11	7.5	27.45	99.54

Sample preparation[7-9]

For analysis of Ziprasidone in capsules, the commercial brands of 20 mg capsule were weighed and then emptied and reweigh the empty shell. 20 capsule were taken and mix uniformly powder equivalent to 20 mg (potency claimed) was taken in to 100 ml volumetric flask and volume was made up with solvent. The resulting solution was filtered through whatman No. 41 and filterate was diluted to have concentration in between the linearity range obtained. The results obtained are given in Table 3.

Results and Discussion

In the present work, estimation Ziprasidone in bulk and capsule dosage form using 10 M urea as solubilising agent. There was no interference of urea and commonly used additives present in tablet formulations.

A critical evaluation of the proposed methods was performed by statistical analysis of the experimental data. In order to demonstrate the validity and applicability of the proposed methods, recovery studies were performed. Hence, the proposed methods could be successfully applied to the determination of Ziprasidone in the commercially available bulk and tablet dosage form. Thus, it may be concluded that the proposed method of analysis are new, simple, cost-effective, environmentally friendly, safe, accurate and reproducible. Definitely, there is further scope of 10 M urea solution as solubilizing agent for other poorly water-soluble drugs. There was no interference of urea in the estimation.

The proposed method for determination of Ziprasidone showed molar absortivity of (1.776E+04 l/mol.cm) linear regression of absorbance on concentration gave the equation (0.944x-0.124) with correlation coefficient (r) of (0.9989). Relative mean standard deviation of (0.01) and (0.08) was observed for analysis of 5 replicates samples of two batches A and B respectively. To evaluate the validity and reproducibility of the method, known amount of pure drug was added to the previously analysed pharmaceutical preparation and the resultant mixture was analysed, and Percentage recovery data shown in Table 3.

Table 3: Estimation of Ziprasidone in marketed formulation-Capsule

Capsules formulation (Ziprasidone HCl CAP SUN)	**Label claim (mg/cap)**	**Amount found (mg/cap) ± S.D.**	**Recovery studies Amount added**	**Amount found**	**Recovery %**
Batch A	20	19.58 ± 0.11	2.5	22.46	99.77
Batch B	20	19.75 ± 0.33	5.0	24.68	99.40
Batch C	20	19.94 ± 0.21	7.5	27.39	99.91

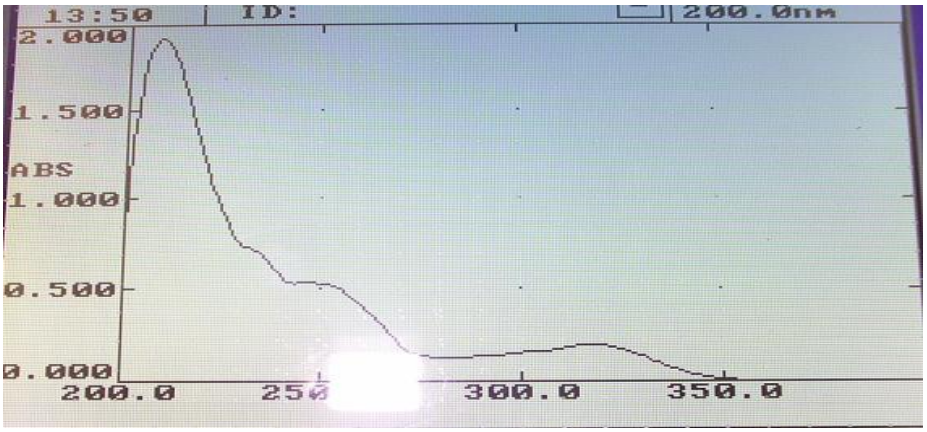

Fig 1: UV Graph for the Ziprasidone

Conclusion

In conclusion the percentage & recovery value indicates that there is no interference of the excipients and additives usually present in dosage form in estimation of Ziprasidone. The

developed method was found to be accurate & precise. Statistical data suggested that it could be used for the routine analysis of Ziprasidone in bulk & formulations.

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Conflict of Interest:

There is no conflict of interest in this Research Work.

Author contribution:

All the authors contributed the research work and writing Part.

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