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Determination of Fluoxetine and Zonisamide by UV Spectrophotometric method.

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Abstract

Estimation of Fluoxetine and Zonisamide in API and pharmaceutical formulation was done by UV spectroscopy method. Calibration curves were linear between the concentration ranges of drugs in 2-10 µg/ml for fluoxetine and 2-10 µg/ml for zonisamide. The absorbance value was measure in zero order was 263.5nm for fluoxetine and 238.5 nm for zonisamide respectively and was selected as the wavelength for detection.

Parameter such as linearity, accuracy, precision, limit of detection, limit of quantitation was studied. The method was successfully developed for quantitative determination of Fluoxetine and Zonisamide in pharmaceutical preparations. All the developed methods were applied on tablet formulation and the results were found within the limit as per ICH guideline.

Keywords: Fluoxetine, Zonisamide, UV spectroscopy.

Introduction

Fluoxetine is (dl)-N-Methyl-3-phenyl-3- (α,α,α-trifluoro-p- tolyloxy) propylamine hydrochloride which is nervous system psycho analeptic, antidepressant, selective serotonin reuptake inhibitor and maximally used as major drug in mental depression, obsessive compulsive disorder, bulimia nervosa and in panic disorder. Zonisamide is 1,2-benzoxazol-3-ylmethanesulfonamide and is an anti-seizure drug chemically classified as a sulfonamide. The objective of present study was to develop simple, sensitive, accurate, rapid and cost effective method for estimation of fluoxetine and zonisamide. The developed UV spectroscopic method is easy to handle & simple in terms of linearity, accuracy, precision and specificity.

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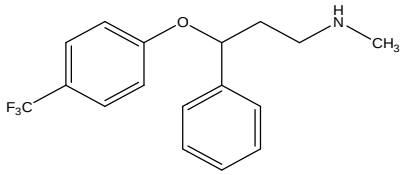
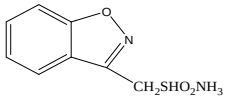


Fluoxetine



Zonisamide

Material and methods:-

Apparatus

A Shimadzu model 1800 double beam UV-Visible spectrophotometer with spectral width of 2 nm, wavelength accuracy of ± 0.1 nm and slit width of 2 nm, instrument scan speed of 600 nm min^{-1}, a pair of 1 cm matched quartz cell was used to measure absorbance of all the solutions. Spectra were automatically obtained by UV-Probe system software. Wavelength range 190 to 1100 nm.

Reagent and Material

The standard sample of fluoxetine and zonisamide drug was kindly supplied as gift sample by Sun Pharma Ltd, India. All chemicals and reagents were used of AR grade. Methanol (AR grade) from Fischer Ltd, Mumbai, Commercial tablets of fluoxetine (Fludac) 60mg tablet manufactured by Cadila Pharmaceuticals, India and zonisamide (Zonegran) 100mg tablet manufactured by Eisai Pharmaceuticals, India were procured from local market and used for analysis of marketed formulation..

Selection of detection wavelength: Solution of drug in was scanned over the range of 200-400 nm. The absorbance values were measure in zero order was 263.5nm for fluoxetine and 238.5 nm for zonisamide respectively and were selected as the wavelength for detection.

Preparation of standard stock solutions:

Stock solution of fluoxetine and zonisamide drug in 100 µg/ml is prepared by dissolving 10 mg fluoxetine drug and zonisamide drug in separate 100 ml volumetric flask and the volume is make up to the mark by Methanol & final concentration of solution containing 100ug/ml and was further diluted to make final conc. to 10 µg/ml.

Selection of Analytical Concentration Range:

For each drug appropriate aliquots were pipetted out from the standard stock solution into series of 10 ml volumetric flask. The volume was made up to the mark with methanol to get set of solution for each drug having concentration 2-10 µg/ml of fluoxetine drug and 2-10 µg/ml of zonisamide drug respectively. The absorbance of each of these solutions were measured at selected wavelength and plotted against concentration.

Tablet Analysis

Twenty tablets of fluoxetine (Fludac) 60mg tablet and zonisamide (Zonegran) 100mg tablet were weighed; their average weigh was determined and finally crushed to powder sample. From the triturate, tablet powder equivalent to 100mg of fluoxetine and zonisamide 100 mg was weighed and transfer to 100 ml separate volumetric flasks and dissolved in 50ml methanol and the contents was kept in ultrasonicater for 30 min. finally the volume was made up to the mark with methanol. The solution was filtered through Whatman filter paper no.41.This tablet solution was further diluted to obtain 1µg/ml of fluoxetine and zonisamide.

METHOD DEVELOPMENT:-

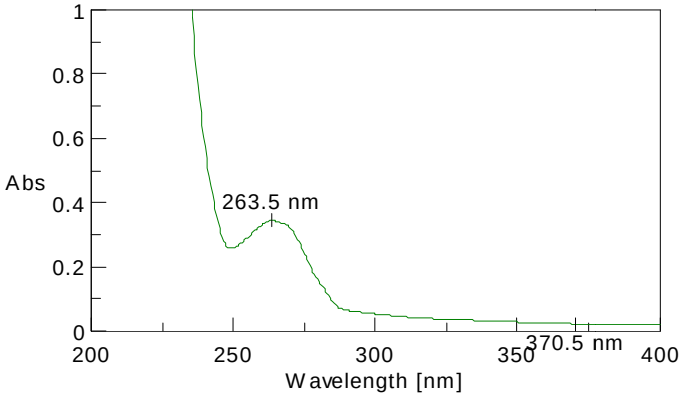


Fig. 1 UV spectra of Fluoxetine

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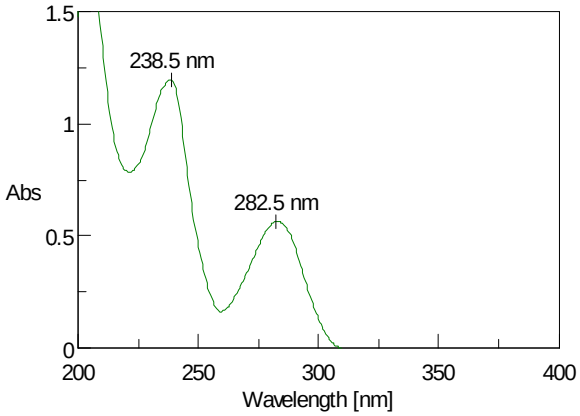

Fig.2 UV spectra of Zonisamide

METHOD VALIDATION

Linearity

For quantitative analysis of Fluoxetine, the calibration curves were plotted for each concentration ranges.

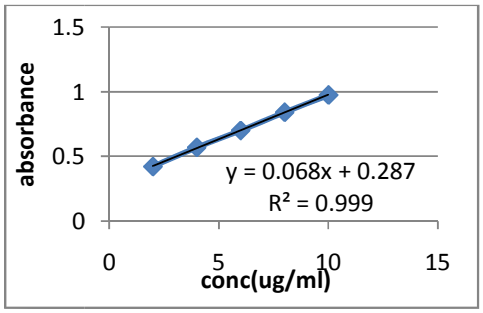

Fig.3 Calibration curve of Fluoxetine

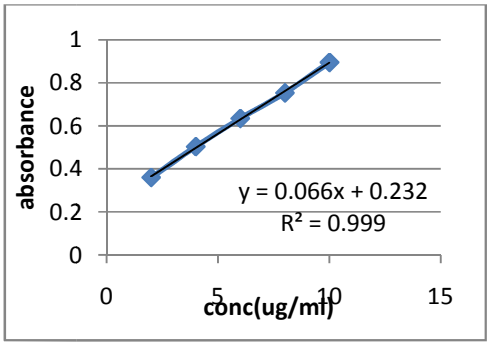

Fig.4 Calibration curve of Zonisamide

Accuracy

The accuracy was determined by standard addition method. Three different levels (80%, 100% and 120%) of standards were spiked to commercial tablets in triplicate. The mean of percentage recoveries and the % RSD was calculated given in (Table 1)

Precision

The reproducibility of proposed method was determined by performing tablet assay at different time intervals (2 hour interval) on same day (Intra-day precision) and on three different days (Inter-day precision) at concentration of Fluoxetine and Zonisamide at the concentration 1 µg/ml (Table 2)

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

LOD is the lowest amount of an analyte in a sample that can be detected but not necessarily quantitated an exact value. LOQ is the lowest amount of an analyte in a sample that can be quantitatively determined with suitable precision and accuracy.

$LOD = 3.3\ \sigma/S$

$LOQ = 10\ \sigma/S$ Where, σ = standard deviation of the y-intercepts of regression line S = slope of the calibration curve.

Result and Discussion

The UV method for Fluoxetine and Zonisamide are found to be linear, correlation coefficient is near to 0.999(Fig 3, 4) respectively. In accuracy study for Fluoxetine and Zonisamide % recovery was found to be 99.83 & 99.42 respectively. % RSD for both methods was less than 2 % (Table 1). Good precision was found for both methods % RSD for zero order intraday precision& interday precision was found to be 0.68& 0.30 respectively (Table 2). Linearity range for both methods was found to be 2-10µg/ml. Regressions equation for Fluoxetine was $y = 0.068x + 0.287$ & for Zonisamide $y = 0.066x + 0.232$ (Table 3). Limit of detection of by Fluoxetine was 0.9µg/ml & for Zonisamide was 1.06 µg/ml. Limit of quantitation of Fluoxetine was 0.4 & for Zonisamide was 0.29. (Table 3)

Conclusion

The proposed UV spectroscopic method provides simple, precise, accurate and reproducible quantitative analysis for determination of Fluoxetine and Zonisamide in pharmaceutical formulations. The method was validated as per ICH guidelines in terms of linearity, accuracy, precision, limits of detection (LOD) and quantification (LOQ). The

proposed method can be used for routine analysis and quality control assay of Fluoxetine and Zonisamide in pharmaceutical dosage form.

Acknowledgement

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Declaration of Interest statement

Conflict of Interest: No.

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