Comparative Assay of Citalopram in Different Media

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Abstract

Citalopram is one of a class of antidepressants known as selective serotonin reuptake inhibitors. Citalopram blocks the reuptake of serotonin at the serotonin reuptake pump of the neuronal membrane, enhancing the actions of serotonin on SHT1a autoreceptors. SSRIs bind with significantly less affinity to acetylcholine, histamine and norepinephrine receptors than tricyclic antidepressant drugs Using UV spectrophotometer a simple, economical, least time consuming and accurate method for comparison of different brand of citalopram, has been developed. The assay is based on the UV absorbance maxima at about wavelength of 244 nm using distilled water as solvent. Four different brand of citalopram was dissolved in buffer of pH 1, pH 4 and water and then various dilutions are prepared (200 ppm, 100 ppm, 50 ppm and 25 ppm). The absorbance of these drugs was measured at 244 nm against the solvent blank and the assay was calculated by using the absorbance of active. We obtain linear relationship of four brands of citalopram when diluted to form 200 ppm, 100 ppm, 50 ppm, 25 ppm and absorbance of all brand are maximum in pH 4. Squared correlation coefficient value of all the brands of citalopram are well within the limit.

Keywords: Antidepressants; UV spectrophotometer; Autoreceptors

Introduction

Citalopram is white to off white fine crystalline powder which is freely soluble in water chloroform and ethanol. Its melts at 182-183°C while boils at 175-181°C. Chemical name of citalopram is 1-3-dimethylamino propyl-1-4-fluorophenyl-1, 3-dihydro-2-benzofuran-5-carbonitrile and molecular formula is C20H21FN2O [1]. Citalopram is an antidepressant belonging to class “selective serotonin reuptake inhibitors” (SSRIs). Citalopram is used to treat depression related with anxiety, mood disorders and dysmorphic disorders. The antidepressant, anti bulimic and anti obsessive-compulsive activities, is due to inhibition of reuptake of serotonin in CNS [2]. In vitro studies of citalopram shows that it is a potent and selective inhibitor of serotonin uptake CNS has less activity for reuptake of norepinephrine and dopamine [3]. It has no significant affinity for receptors such as cholinergic, GABA, histaminergic, dopaminergic, benzodiazepine or serotonergic 5HT1A, 5HT2, 5HT1B and adrenergic a1, a2, b. It does not inhibit monoamine oxidase [4] Citalopram has rapid absorption in GI tract. Its peak plasma concentration is 4 hours; bioavailability is 80% by oral administration. Its absorption does not affected by food. 12-23% if drug eliminates in unchanged form through urine and 10% through feces [5]. It is highly lipophilic and widely distributed throughout the body it cross the blood brain barrier. Dimethylcitalopram is a metabolite of citalopram that cannot cross brain barrier [6]. It metabolizes through liver and metabolites which are formed are dimethyl citalopram, citalopram N-oxide, and deaminated propionic acid derivatives. Enzymes that convert citalopram into different metabolites are CYP450, 3A4, 2C19, CYP2D6. Metabolites of citalopram have little effectiveness as compare to parent compound and donor contribute in clinical effect of drug. Citalopram HBr is a racemic bicyclic derivative designated (±)-1-(3-dimethylaminopropyl)-1-(4-fluorophenyl)-1, 3-dihydroisobenzofuran-5-carbonitrile, HBr. The molecular formula is C20H21BrFN2O and its molecular weight is 405.35 (Figure 1) [7]. Citalopram HBr is sparingly soluble in water and soluble in ethanol. HBr in strengths equivalent to 10 mg citalopram base. Furancarbonitrile is one of the SSRIs used as an antidepressant. The drug is also effective in reducing ethanol uptake in alcoholics and is used in depressed patients who also suffer from tardive dyskinesia in preference to tricyclic antidepressants, which exaggerate this condition [8].

A number of techniques are reported for the determination of enantiomeric citalopram that includes Spectrophotometric methods [9,10], fluorimetric methods [9,10] capillary electrophoresis [11,12] electrochemical and chromatographic method [13-17]. The spectrophotometric methods include ethanol as a solvent. In our study de ionized water is used as a solvent which is cheaper than other solvents. Availability of the drug is also measured using different Buffer solutions i.e pH 1 buffer corresponds to the pH of empty stomach; pH 4 buffer corresponds to the pH of full stomach. We have done these types of assay for different drugs which are very useful for selection of best drugs [18-24].

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Figure 1: Structure of Citalopram.
Methodology

Experimental

Material and reagents: Glass wares, beakers, volumetric flask, measuring cylinder, pipette and stirrer were used. All glass wares were washed and rinsed with double distilled water. Reagents used were as follows 0.1N hydrochloric acid and de-ionized water or double distilled water. All the Reagents were of Analytical grade.

Instruments


Preparation of pH 1 and pH 4 solution

Methods Preparation of simulated gastric juice and buffers 0.1 N hydrochloric acid was prepared by diluting 9 mL hydrochloric acid of analytical grade (11 N) in a liter volumetric flask and the volume was made up to the mark with de-ionized water.

Procedure

The four different brands (cipram, manipram, citalo, pramcet) were purchased from the medical store located in Karachi, Pakistan. Accurately weighed 20 mg of each tablet of four different brands of citalopram, 20 tablets were then crushed with the help of motor and pestle and transferred to volumetric flask and then sufficient pH 1 was added to produce 100 ml same procedure was repeated for pH 4 and for water.

Dilutions

From the sample solution of different brands of citalopram different dilutions were made. Solutions of 200 ppm, 100 ppm, 50 ppm and 25 ppm of all the three brands were prepared. After preparation of standard and capsule solutions, strength of solution 200 ppm in 100 ml and different dilutions absorbance of the sample preparation and standard preparation in 1cm cell at the wavelength of maximum absorbance at about 244 nm, using a spectrophotometer, using the blank solution. Calculate the quantity in mg, of citalopram per capsule.

Result and Discussion

Pharmaceutical assay was carried out by using spectrophotometer on all brands of citalopram during the study. Tables 1 and 2 shows name brand and absorbance of different brands. Four different brands of citalopram (cipram, manipram, citalo, pramcet) are taken and their solutions of 200 ppm, 100 ppm, 50 ppm and 25 ppm are prepared. Their percent assay is calculated and regression equation and regression line is obtained to predict further availability of drug.

For detect linearity solutions of 200 ppm, 100 ppm, 50 ppm and 25 ppm is prepared and four absorbances in triplicate were taken at each level in spectrophotometric analysis. For linearity plot concentration vs. absorbance at level 200 ppm, 100 ppm, 50 ppm and 25 ppm is shown in Figures 1-6. Two and three squared correlation coefficient was found 0.9707 for brand A and 0.99 for brand B, C, D. Squared correlation coefficient value is well within the limit. Absorbance of all four brands of citalopram is maximum in pH 4 (shows maximum absorbance in full stomach).

Conclusion

Pharmaceutical assay was carried out by using spectrophotometer on all brands of citalopram during the study. A good linear relationship was observed for cipram, manipram, pramcet, and citalo the concentration ranges of 200 ppm, 100 ppm, 50 ppm and 25 ppm. The correlation coefficient for citalopram was found to be 0.9707 for brand A and 0.99 for brand B, C, D. Squared correlation coefficient value is well within the limit. Absorbance of all four brands of citalopram is maximum in pH 4 (shows maximum absorbance in full stomach).
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Reference


6. FDA label


