Research Article

UV SPECTROPHOTOMETRIC METHOD DEVELOPMENT AND VALIDATION FOR DETERMINATION OF PAROXETINE HYDROCHLORIDE IN PHARMACEUTICAL DOSAGE FORM

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ABSTRACT

A simple and reproducible method was developed for the assay of paroxetine in tablets. The excipients in the commercial tablet preparation did not interfere with the assay. Beer's law is obeyed in the range 2.0 - 10.0 µg.mL–1 at .max 294 nm. The molar absorptivity was calculated. Six triplicate analyses of solutions containing six different concentrations of the examined drug were carried out and gave a mean correlation coefficient 0.999. The proposed method was applied to the determination of the examined drug in market tablet and the results demonstrated that the method is equally accurate, precise and reproducible as the official methods.

Keywords: Paroxetine hydrochloride, UV spectrophotometer

INTRODUCTION

Paroxetine;(3S,4R)-3-[(1,3-benzodioxol-5-vloxy)methyl]-4-(4-flurophenyl) piperidine (PRX) is a new generation antidepressant drug. It exerts its antidepressant effect through a selective inhibition for the reuptake of the neurotransmitter serotonin by the presynaptic receptors. PRX is comparable to the tricyclic antidepressants in their clinical efficacy, however, PRX is safer and has greater acceptance by the patients [1]. It is also prescribed in the treatment of related disorders, such as obsessive-compulsive disorder, panic fits, social phobia, and posttraumatic stress [2]. PRX is devoid of sedative effect and remarkably safe in overdose. PRX takes 5.2 hours to reach the peak, with extended half-life (21 hours) that allowed the introduction of formulations for once-daily dosing [3]. These combined qualities made PRX the most widely prescribed antidepressants [4]. The methods reported for quantitative determination of PRX in tablets and/or biological fluids include voltammeter [5, 6] , densitometry [7, 8], high-performance liquid chromatography [9–14], gas chromatography [15–17], and capillary electrophoresis [18]. These methods offered the required sensitivity and selectivity for the analysis of PRX in biological fluids; however, their sophisticated instrumentation and high analysis cost limited their routine use in quality control laboratories for analysis of PRX in its pharmaceutical tablets.

The present study describes the development of simple and rapid spectrophotometer method for the determination of PRX in its tablets.

MATERIALS AND METHODS

Samples

The paroxetine reference substance (assigned purity 99.8%) and coated tablets containing paroxetine was supplied by Glaxo smithkline pharmaceutical Ltd. Each film-coated tablet contains paroxetine hydrochloride equivalent to paroxetine as follows: 10 mg–yellow (scored); 20 mg–pink (scored); 30 mg–blue, 40 mg–green The tablets where claimed to contain the following inactive agents   dibasic calcium phosphate dihydrate, hypromellose, magnesium stearate, polyethylene glycols, polysorbate 80, sodium starch glycollate, titanium dioxide, and 1 or more of the following: D&C Red No. 30 aluminum lake, D&C Yellow No. 10 aluminum lake, FD&C Blue No. 2 aluminum lake, FD&C Yellow No. 6 aluminum lake.

Reagents and solvents

All other chemicals were of analytical grade.

Instrumentation and conditions

Spectral and absorbance measurements were made with a JASCO 7800 UV-VIS and INTRALAB 5100 detector with 10 mm quartz cells at 294 nm. The solutions were prepared in methanol.

Methods

Paroxetine reference standard

Solutions of the paroxetine hydrochloride reference standard equivalent to paroxetine (200 µg mL–1) were prepared by accurately weighing 22.15 mg paroxetine hydrochloride reference substance (equivalent to 20 mg of paroxetine) into 100 mL volumetric flask. From this solution working standard solution of concentration of 0 to 10 µg /ml of paroxetine .were prepared by dilution with methanol .The absorbance of this solution was measured at 294 nm against reagent blank. Calibration curve was prepared.   The determination was conducted in triplicate.

Assay of paroxetine in tablets

To analyze the concentration of paroxetine tablets, twenty tablets were weighed to obtain the average tablet weight. The tablets were ground up and powdered tablets equivalent to 100 mg of paroxetine was were transferred to a 500 mL volumetric flask; 250 mL methanol were added and the flask was shaken for 20 minutes by mechanical shaker followed by addition of methanol to volume (final concentration of 0.2 mg.mL–1). The contents of the flask were mixed well and filtered using whatman filter of 0.45 microns. Aliquots of 5 mL of this solution were transferred to a 200 mL volumetric flask and methanol was added to volume to give an estimated concentration of 5 µg.mL–1. This solution was prepared six times and the absorbance of each solution was determined at 294 nm and the concentration of drug in sample solution was determined from calibration curve. All determinations were conducted in triplicate.

Method validation

The accuracy and precision of the assay, as well linearity of the calibration curve, were determined (Fig. 1). Having established the quantitative relationships between the parameters studied, and knowing the predictive performance of their association model, a linear simple regression by the least squares method was applied. The statistical analysis was calculated by ANOVA.

The statistical accuracy was determined by adding known amounts of paroxetine reference standard to the samples at the beginning of the process. The recovery studies were carried out at 3 different concentration levels of reference standard, respectively, R1, R2, R3, and R4. The percentage recovery for added paroxetine hydrochloride was calculated using the equation proposed by Association of Analytical Communities.Communities.

RESULTS AND DISCUSSION

The development of spectrophotometer methods for the determination of drugs has increased considerable in recent years because of their importance in pharmaceutical analysis. The calibration curve for paroxetine was obtained by plotting the peak area versus concentration. Linearity was found to be in the range of 2.0 - 10.0 µg.mL–1 with significantly high value of correlation coefficient r2 = 0.9997; the representative equation was y = 0.0503x + 0.1139 (Fig. 1).
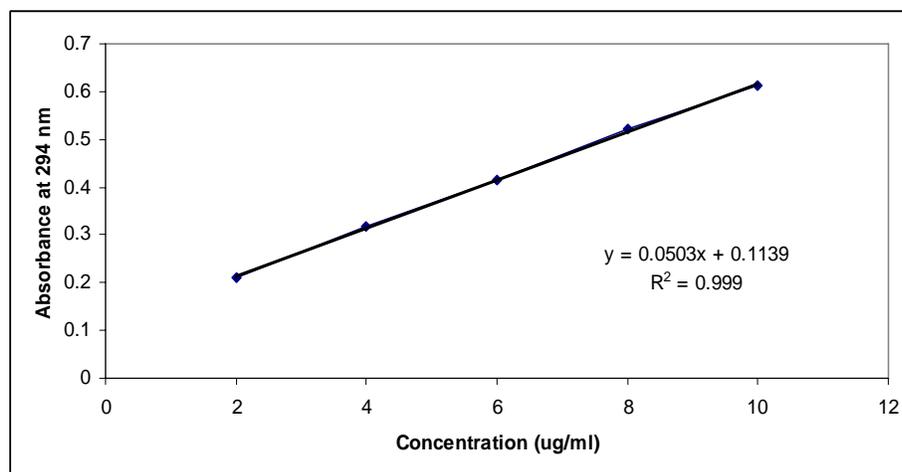
Fig. 1: Calibration curve constructed for paroxetine from standard solutions at five concentration levels in the range 2 to 10 μg/m

Table 1: Quantitative parameters for determination of paroxetine in dosage form.

Parameter	Results
λmax (nm)	294
ε	18321.32
Beers Law (μg/ml)	2 to 10
Regression equation	
Intercept (c)	0.113
Slope (m)	0.050
Correlation coefficient	0.999

Table 2: Determination of paroxetine in dosage form

Dosage Strength (mg)	Experimental amount (mg)	% Purity
10	9.94	99.4
10	9.87	98.7
10	10.03	100.3
10	9.85	98.5
10	9.9	99
10	10.06	100.6

* Each value is the mean of three analyses.

The coefficient of variation (CV) on the basis of the absorbance for six triplicate measurements found to be between 0.09 and 0.80%. Paroxetine tablets (PAXIL) (10 mg) were analyzed and the results obtained can be seen in Table 2.

The percentage of gotten pureness was of 99.42 % and the coefficient of variation of 0.87%.

The assays were validated by means of the analysis of variance, as described in official literature. This developed method presented no parallelism deviation and no linearity deviation (P < 0.05). The precision and accuracy of the assay were demonstrated. The accuracy expresses the agreement between the accepted value and the value found. The recoveries obtained showed that a high accuracy of the presented method Table 3.

Table 3: Experimental values obtained in the recovery test for paroxetine in dosage form

Drug name	Amount label claimed / tablet	Amount of standard added mg/tablet	Total amount recovered mg /tablet	% Recovery *	Mean recovery %
Paroxetine	10	0	9.93	99.3	100.27
	10	2.5	12.7	101.6	
	10	7.5	17.37	99.25	
	10	10	20.19	100.95	

*Each value is the mean of three analysis

CONCLUSION

The obtained and statistical parameters for determination of paroxetine in raw material

And coated tablets demonstrate that the proposed UV spectrophotometer method by is simple, accurate, fast and precise. The method showed acceptable linearity and accuracy. The proposed method is highly sensitive; therefore it could de used easily for the routine analysis of pure drugs and their formulations.

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