Area under Curve UV Spectrophotometric Method for the Determination of Chlorcyclizine Hydrochloride in Bulk.

Chordiya Bhakti D*, Patel Salim G, Phalke Pallavi L.

Vishal Institute of Pharmaceutical Education & Research, Ale, Tal: Junnar, Pune, Maharashtra. India.

ABSTRACT

The current work is carried out to for estimation of Chlorcyclizine Hydrochloridein bulk by utilizing area under curve (AUC) method using UV-Visible spectrophotometry. For this purpose the wavelength range 220-240nm was selected. Distilled water was used as a solvent throughout the work. Linearity was observed in concentration range 5-25µg/ml (R^2=0.996) for the method. The present method was found to be simple & linear which can be used for routine quality control analysis for spectrophotometric estimation of Chlorcyclizine Hydrochloride in bulk.

Keywords: Chlorcyclizine Hydrochloride, Area under curve, Antihistaminic, λmax.

INTRODUCTION

Chlorcyclizine hydrate is a piperazine derivative and act as histamine H1 antagonist with low sedative action but frequent gastrointestinal irritation.[1] Chlorcyclizine is also having antimuscarnic action which is combined with the antihistaminic effect of cyclizine which may be partially responsible for its central antiemetic effect by an action on the vestibular system.

Chlorcyclizine hydrochloride also shows slight anticholinergic and antispasmodic action and also enhances action of epinephrine.

Chlorcyclizine hydrate selectively binds to histaminic receptor but do not activate it thereby blocking the action of endogenous histamine. It acts on bronchi, capillaries and smooth muscles to prevent or allay seasonal rhinitis, motion sleekness and allergic dermatitis. Structure of Chlorcyclizine is shown Fig. 1. Molecular structure of Chlorcyclizine HCl.

The anti-emetic action of chorcyclizine is thought to be via anti-muscarnic and anti histaminic effect on chemoreceptor trigger zone of vomiting center in the midbrain. It shows some adverse effects like dizziness, drowsiness, sedation, chorea, dry mouth, excitatory phenomena, tachycardia, localized erythematous rash and blurring vision. Some serious adverse effects of chorcyclizine are dystonic reaction, transient paralysis, Anaphylaxis, Agranulocytosis and hypersensitivity. Dose of chorcyclizine is 50mg daily.[1,2,3]

Figure 1: Molecular structure of Chlorcyclizine HCl.

MATERIALS AND METHOD

Chemicals:

Chlorcyclizine Hydrochloride was supplied by Swapnaroop agencies, Aurangabad, Maharashtra. Methanol (S.D. Fine Chemicals, Mumbai, India) was used. All chemicals and reagents were of analytical reagent (AR) grade.

Instrumentation:

A Shimadzu (Kyoto, Japan) model UV-1800 double beam UV-Visible spectrophotometer attached with computer operated software UV probe 2.33 with spectral width of 2 nm, wavelength accuracy of 0.5 nm and pair of 1 cm matched quartz cells was used to measure absorbance of the resulting

solutions. Analytical balance of make Mettler Toledo (Model JL1503- C) was used for weighing purpose.

METHOD

Experimental Work

To check the solubility of Chlorcyclizine Hydrochloride:

10 mg of Chlorcyclizine Hydrochloride was weighed and solubility of this sample was checked in double distilled water, methanol, and ethanol.

To identify the λ max of Chlorcyclizine Hydrochloride:

Weigh 10 mg of the pure drug and dissolve it in small portion of methanol and make up the volume Upto 10 ml using distilled water to give a standard stock solution of 1000µg/ml. From above solution 2.5 ml of the standard solution was withdrawn in volumetric flask and diluted to 25ml to prepare 100ppm solution. Suitable dilutions were made with distilled water to get standard solutions of concentration: 5, 10, 15, 20, 25µg/ml. [3, 4]. Spectrum Peak details are shown in Fig. 2. Spectrum peak pick.

Table 1: Calibration curve of Chlorcyclizine HCl

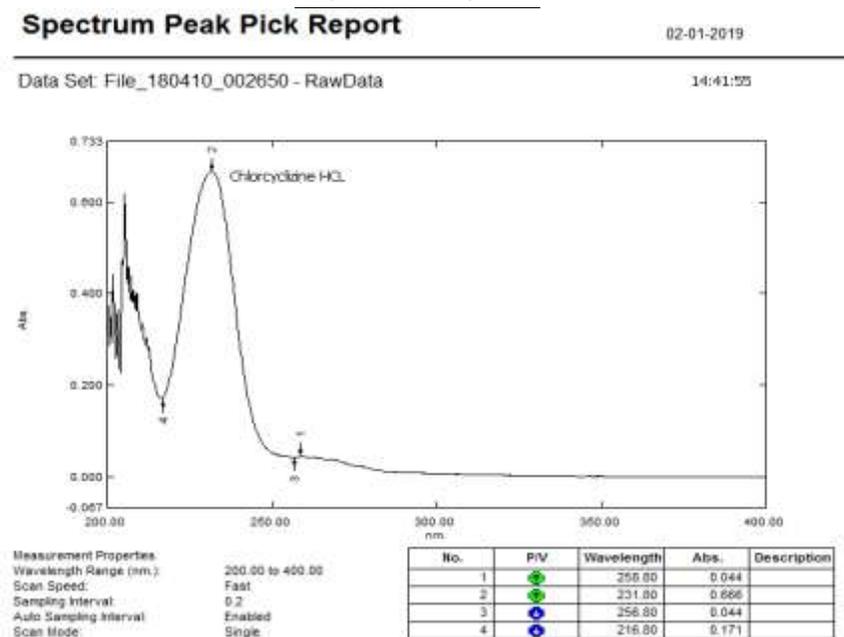| Conc	Abs
5	0.2523
10	0.428
15	0.666
20	0.8154
25	1.0442

Figure 2: Spectrum peak pick

c) Area under curve method:

In case of AUC the calculation of integrated value of absorbance with respect to the wavelength between two selected wavelengths λ1 and λ2. Area calculation processing item calculates the area bound by the curve and the horizontal axis.

Area calculation: $(\alpha+\beta) = \int_{\lambda 2}^{\lambda 1} Ad\lambda$

Where, α is area of portion bounded by curve data and a straight line connecting the start and end point β is the area of portion bounded by a straight line connecting the start and end point on curve data and horizontal axis λ1 and λ2 are wavelength range start and end point of curve region

The horizontal axis is selected by entering the wavelength range over which area has to be calculated. To get the linearity between area under curve and concentration repeatedly observed wavelength range is selected. The above mentioned spectrum was used to calculate AUC. [5, 6, 12]

d) Analytical Method Development and Validation:

Linearity:

The linearity of an analytical procedure is the interval between the upper and lower concentration of an analyte in the sample. [7, 8]For which it has been demonstrated that the analytical procedure is of linearity. The standard solution of Chlorcyclizine hydrochloride (5, 10, 15, 20 and 25µg/ml) was pipette out in a separated series of 10ml volumetric flask. Make up the volume with distilled water and mixed well. The absorbance maxima and area under curve for the solutions was measured at 231nm and range of 220-240nm for two methods respectively against distilled water as blank.

Calibration Curve table of Chlorcyclizine is shown in Table.1. Calibration curve of Chlorcyclizine HCl

RESULTS AND DISCUSSION:

A) Calibration curve for drug:

Absorbance maxima method:

Under the experimental conditions described, the graph obtained for the absorbance maxima for pure drug showed linear relationship (Figure 3).Regression analysis was made for the slope, intercept and correlation-coefficient values. The regression equations of calibration curve were y = 0.039x + 0.049 (r^2 = 0.996) at 231.80nmfor absorption maxima the range was found to be5-25µg/ml for the UV spectrometric analysis.

Calibration Curve is shown in Table.1. Calibration curve of Chlorcyclizine HCl. Calibration Curve of Chlorcyclizine HCl is shown in Figure 3.Calibration curve of Chlorcyclizine HCl.
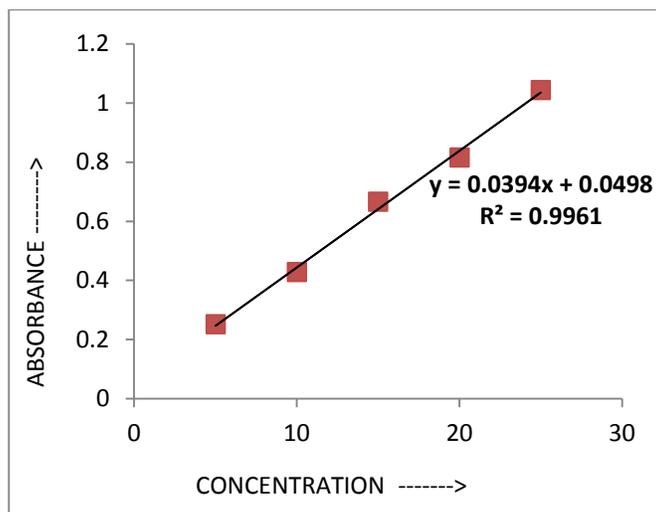
Figure 3: Calibration curve of Chlorcyclizine HCl

B) Area under Curve method

Under the experimental conditions described the graph obtained for AUC spectrum showed linear relationship. Regression analysis was made for the slope, intercept, correlation coefficient values. The equation is $y = 0.039x + 0.049$ ($R^2 = 0.996$) at 220-240 nm for area under curve spectrum. The range was found to be 5-25µg/ml or area under curve spectrophotometric analysis. Area under curve of chlorcyclizine HCl is shown in Fig.4. Area Under curve of Chlorcyclizine HCl Area under curve of Chlorcyclizine HCl is shown in Table.2. Area under curve of Chlorcyclizine HCl
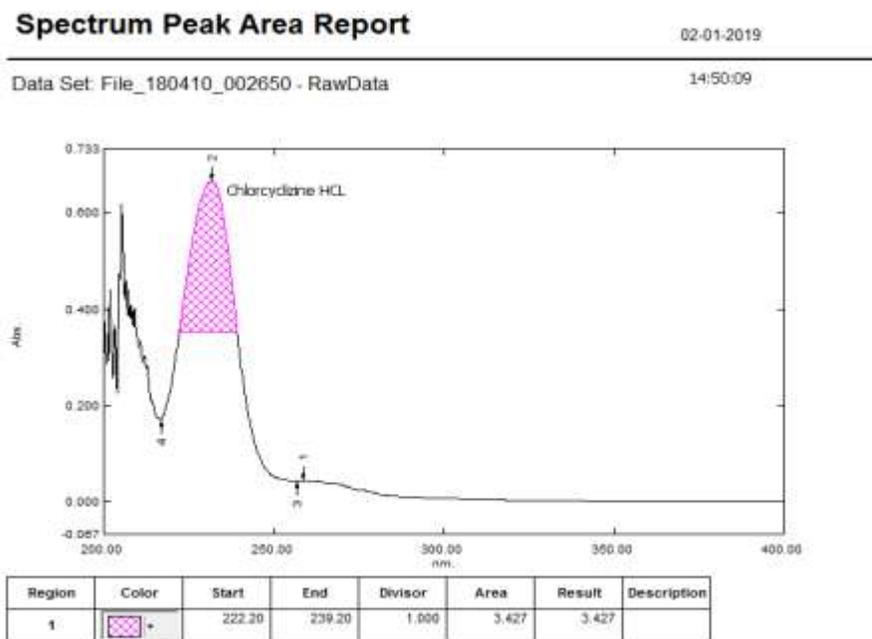

Figure 4: Area Under curve of Chlorcyclizine HCl

Table 2: Area under curve of Chlorcyclizine HCl

Parameter	AUC
Wavelength Range (nm)	220-240
Concentration range (µg/ml)	5-25
Slope(m)	0.03942
Intercept(c)	0.04982
Correlation coefficient(R^2)	0.996

CONCLUSION:

Simple and economic UV spectrophotometric AUC methods can be used for the estimation of Chlorcyclizine Hydrochloride. Because of cost-effective and minimal maintenance, the present UV spectrophotometric methods can be preferred at small scale industries and successfully applied and suggested for the quantitative analysis of Chlorcyclizine Hydrochloride in pharmaceutical formulations for QC, where economy and time are essential and to assure therapeutic efficacy.

ACKNOWLEDGEMENT

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