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Original Article

Spectrophotometric determination of Chlorpheniramine Maleate and Phenylpropanolamine Hydrochloride by “two wavelengths method”

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ABSTRACT

Background: Early methods for simultaneous determination of Chlorpheniramine Maleate (CPM) and Phenylpropanolamine Hydrochloride (PPM) in combined pharmaceutical dosage forms are expensive and time consuming methods, so this study has been performed for simultaneous determination by using UV spectrophotometer to save excessive cost and time.

Method: A rapid and simple method for simultaneous determination of Chlorpheniramine Maleate (CPM) and Phenylpropanolamine Hydrochloride (PPM) by “Two Wavelengths Method” using UV spectrophotometer has been developed in combined pharmaceutical dosage forms. “The absorbance difference between two points on the mixture spectra is directly proportional to the concentration of the component of interest independent of interfering component”. For selection of two wavelengths for estimation of PPM at 257 nm it showed remarkable absorbance (λ_{\max} of PPM) which was noted and another point where it showed equal absorbance to that of 257 nm was reviewed over the curve and was found out as 263.6 nm. For selection of two wavelengths for estimation of CPM, at 261.6 nm (λ_{\max} of CPM) it showed remarkable absorbance. Another point where it showed equal absorbance to that of 261.6 nm was reviewed over the curve and was found out as 253.2 nm.

Results and discussion: In the present research work an attempt has been made to develop simple method of analysis for combination of Phenylpropanolamine Hydrochloride and Chlorpheniramine Maleate as literature review revealed that no other simple reported method except HPLC, which requires sophisticated instrument and HPLC grade solvents. This method presented above utilizes the absorbance of ultraviolet radiations by PPM and CPM, distilled water was the solvent employed for this method. This method is advantageous as requires less memory capacity for storage of calibration data as well as less time consuming as compare to multicomponent analysis by other instruments.

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Conclusion: The most striking features of “Two Wavelengths Method” are its simplicity, sensitivity and rapidity. It is also an easier and economical method than HPLC separation technique and does not require the use of any expensive or toxic reagent. These advantages make it especially suitable for routine quality control.

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1. Introduction

Chlorpheniramine Maleate inhibits the effects of histamine on capillary permeability and bronchial smooth muscles. It is an anti-allergic drug, widely used in cough-cold preparations. Phenylpropanolamine Hydrochloride is indirectly acting sympathomimetic agent and it is used in the symptomatic relief of nasal congestion. These drugs are used either alone or in combination. Besides the official methods (IP & USP) the other analytical methods available in literature for determination of Chlorpheniramine Maleate,^{1–9} Phenylpropanolamine Hydrochloride^{10–17} and combination of Chlorpheniramine Maleate & Phenylpropanolamine Hydrochloride^{18–20} have been mentioned. These methods are time consuming; therefore an alternative “two wave lengths method” by UV spectrophotometry is rendered.

2. Materials and methods

The simultaneous determination of CPM and PPM is not possible by direct UV-absorption measurement method because of spectral overlap of their principle maxima. “The absorbance difference between two points on the mixture spectra is directly proportional to the concentration of the component of interest independent of interfering component” The most striking features of “Two Wavelengths Method” are its simplicity, sensitivity and rapidity. It is also an easier and economical method than HPLC separation technique and does not require the use of any expensive or toxic reagent. These advantages make it especially suitable for routine quality control.

2.1. Materials

Authentic specimens of CPM and PPM were provided as a gift samples from M/S Plethico Pharmaceuticals, Indore.

2.2. Methods

2.2.1. Precise description of solvent and linearity studies

The common solvent distilled water was used for simultaneous estimation of CPM and PPM by “Two Wavelengths Method” using UV spectrophotometer has been developed in combined pharmaceutical dosage forms. The drug solutions obey the Beer’s Law in the working range of concentrations i.e. 0–24 mcg/ml for CPM and 0–150 mcg/ml for PPM.

2.2.2. Two wavelengths calculation for tablet formulation

In the normal course of analysis by two wavelength method one of the drug is considered as a component of interest and

the other drug is considered as an interfering component and vice-versa. The selected concentration combination of CPM and PPM both drugs were estimated by utilizing Two Wavelength data processing program.

2.2.3. Preparation of stock solutions

The standard solutions of CPM and PPM were prepared by weighing 25 mg of PPM and 10 mg of CPM respectively and transferred to different 100 ml volumetric flasks, each drug was dissolved in 50 ml of distilled water and finally the volume was made upto the mark with distilled water to attain 100 mcg/ml of CPM and 250 mcg/ml of PPM. From above solutions 40 mcg/ml of CPM and 250 mcg/ml of PPM solutions were prepared.

2.2.4. Selection of wavelength for estimation of CPM and PPM

The solutions were scanned between 325–200 nm against blank and the maximum absorbance for PPM and CPM were found to be 257 nm and 261.6 nm respectively. The overlay spectra for both the drugs were taken by using the concentration of CPM 40 mcg/ml and PPM 250 mcg/ml. The normal overlay spectra had been shown in Fig. 1.

For selection of two wavelengths for estimation of PPM, the prepared 40 mcg/ml of CPM was scanned between 325–200 nm using medium speed of scanning at 257 nm it showed remarkable absorbance (λ_{max} of PPM) which was noted and another point where it showed equal absorbance to that of 257 nm was reviewed over the curve and was found out as 263.6 nm. These two wavelengths 257 and 263.6 nm were used for the estimation of PPM. For selection of two wavelengths for estimation of CPM, the prepared 250 mcg/ml of PPM was scanned between 325–200 nm using medium speed of scanning. At 261.6 nm (λ_{max} of CPM) it showed remarkable absorbance. Another point where it showed equal absorbance to that of 261.6 nm was reviewed over the curve and was found out as 253.2 nm. These two wavelengths 261.6 and 253.2 nm were used for estimation of CPM as shown in Table 1.

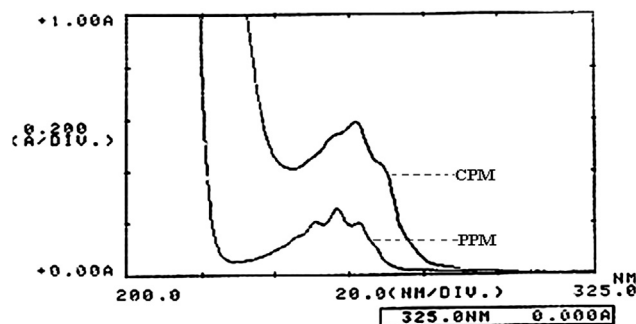


Fig. 1 – Normal overlain spectrum of CPM and PPM.

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