New Analytical Methods for the Determination of Olopatadine (An Anti-allergic Drug) in Eye drops

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Olopatadine is a selective histamine H₁ antagonist. Two simple, rapid and sensitive spectrophotometric methods are developed for the determination of Olopatadine in pharmaceutical dosage forms. The absorption maxima was found to be at 220 nm in 0.1N sodium hydroxide (Method A) and shows linearity over the concentration range of 1-25 µg ml⁻¹ with regression equation 0.108x + 0.019 (r² = 0.999). For Method B ammonium formate (5mM) was chosen in which the absorption maxima was observed at 206 nm and linearity was followed over the concentration range 1-25 µg ml⁻¹ with regression equation is found to be 0.141x + 0.010 (r² = 0.999). The proposed methods can be successfully applied for the determination of Olopatadine in eye drops. The methods were validated as per the ICH guidelines.

Key words: Olopatadine, spectroscopy, Validation, Eye drops, ICH guidelines

INTRODUCTION

Olopatadine (Fig 1) is Anti-Allergic Agent[1]. It is a selective histamine H₁ antagonist that binds to the histamine H₁ receptor. This block the action of endogenous histamine, which subsequently leads to temporary relief of the negative symptoms brought on by histamine. Literature survey revealed that LC-MS methods[2-4] and HPTLC[7] methods were developed for the analysis of Olopatadine in human plasma and ophthalmic solutions and only one spectrophotometric method was available[8] which was developed in a mixture of solvents (Methanol: HCl) with very low linearity range. In the present study two simple, rapid, precise and accurate spectrophotometric methods have been developed for the determination of Olopatadine in pharmaceutical dosage forms and validated as per the ICH guidelines[9-10].

Chemicals and reagents
Sodium hydroxide (Merck), Ammonium formate (Merck) and were purchased. Olopatadine (white, crystalline powder) was obtained as gift sample from SUN Pharmaceuticals (India) was used as such without further purification.

Preparation of sodium hydroxide solution (0.1N)
4 grams of sodium hydroxide was dissolved in 1000 ml of volumetric flask with distilled water.

Preparation of Ammonium formate (5mM): 0.0315 grams of ammonium formate was dissolved in 100 ml of volumetric flask with distilled water.

Preparation of Stock and sample Solution
The standard solution of Olopatadine was prepared by dissolving accurately about 25 mg of the Olopatadine with Methanol in a 25 ml volumetric flask. This stock solution was further diluted with sodium hydroxide (0.1N) for Method A and ammonium formate (5mM) for Method B separately as per the requirement.

Procedure:
Method A
The drug solution was scanned (200-400 nm) against reagent blank i.e. Sodium hydroxide (0.1N) and the absorption spectrum (Fig 2) was recorded. The absorption maximum (λmax) was observed at 220 nm and the absorbance of a series of solutions (1-25 µg ml⁻¹) was recorded at that λmax. A graph was plotted by taking the concentration of the drug solutions on the x-axis and the corresponding absorbance values on the y-axis.

Method B
The drug solution was scanned (200-400 nm) against reagent blank i.e. Ammonium formate (5mM) and the absorption spectrum was recorded (Fig 3) The absorption maximum (λmax) was observed at 206 nm and the absorbance of all the sample solutions (1-25 µg ml⁻¹) was recorded at that λmax. A graph was plotted by taking the concentration of the solutions on the x-axis and the corresponding absorbance values on the y-axis.

Assay procedure for the commercial formulations (Eye drops):
Olopatadine is available as eye drops containing 5 mg of Olopatadine in 5 ml. Olopatadine is available in the local

MATERIALS AND METHODS

Instrumentation
A double beam UV-VIS spectrophotometer (UV-1800, Shimadzu, Japan) connected to computer loaded with spectra manager software UV Probe was employed with spectral bandwidth of 1nm and wavelength accuracy of ±0.3 nm with a pair of 10 mm matched quartz cells. All weights were taken on electronic balance (Denver, Germany).

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market with brand names ALERCHEK (5 mg/5 ml, INDOCO Pharmaceuticals, India) and WINOLAP (5 mg/5 ml, SUN Pharmaceuticals, India). The whole contents of eye drops from each brand containing Olopatadine were transferred into two different 50 ml volumetric flask and made up to volume with Sodium hydroxide (Method A) and Ammonium formate (Method B) as per the requirement. A series of solutions were prepared for Method A, and B, scanned and the corresponding absorbance values were recorded. The % recovery was calculated from the regression equations obtained from the calibration curves.

**Precision and Accuracy:**

The precision study was done as per the ICH guidelines by recording the absorbance of drug solution at (n=6) \( \lambda_{\text{max}} \) for Method A (10 \( \mu \text{g ml}^{-1} \)) and for Method B (20 \( \mu \text{g ml}^{-1} \)) and the % RSD was calculated. Accuracy was evaluated by the percent recovery studies. Here the pre-analysed formulation solution (10 \( \mu \text{g ml}^{-1} \)) was spiked with 80%, 100%, and 120% of pure sample drug solution and the % recovery was calculated.

The RSD values in precision studies were found to be 1.70 and 0.004 for method A and B respectively which are less than 2.0 % indicating that the method is more precise. The % RSD values in accuracy studies were also found to be less than 2.0 % (0.046-0.290) for method A, and B indicating that the method is more accurate. The optical characteristics were shown in Table 1.

**RESULTS AND DISCUSSION**

Beer Lambert’s law was obeyed over the concentration range 1-25 \( \mu \text{g ml}^{-1} \) in both the methods i.e. sodium hydroxide (Method A) and ammonium formate (Method B). The linear regression equations were found to be \( y = 0.108x + 0.019 \) \( (r^2 = 0.999) \) and \( y = 0.141x + 0.010 \) \( (r^2 = 0.999) \) for method A and B (Fig 4-5) respectively.

The percentage of purity in the marketed formulations was found to be 98.82-99.88. The percentage recovery values are given in Table 2.
The present proposed methods can be successfully employed for the determination of Olopatadine in pharmaceutical formulations.

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REFERENCES

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