



ESTIMATION OF PALONOSETRON HYDROCHLORIDE (A 5-HT₃ ANTAGONIST) IN PHARMACEUTICAL DOSAGE FORM BY U.V. SPECTROPHOTOMETRIC METHOD

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ABSTRACT

A simple, rapid, economical, accurate and precise method has been developed for estimation of palonosetron hydrochloride from tablet dosage form. The absorption maxima in ethanol solvent was found to be at 265 nm and Beer's law was obeyed in a concentration range of 7.5-25 µg/mL and coefficient of correlation for palonosetron was found to be 0.9997. The precision accuracy of the developed method was confirmed by repeatability and recovery studies are validated statistically.

The percentage recovery was found to be 99.3% for palonosetron. Standard sensitivity of the above method was 0.0075 µg. This method showed good repeatability and recovery with relative standard deviation less than 2. So, this developed method can be used for the routine analysis of palonosetron from formulations.

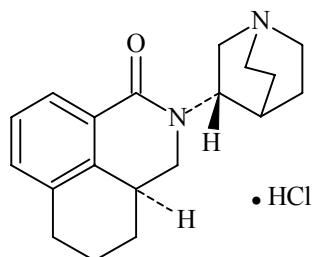
Key words: Palonosetron hydrochloride, U.V. Spectrophotometric method, Ethanol.

INTRODUCTION

Palonosetron hydrochloride is an antiemetic; selective inhibitor of type 3 serotonergic (5-HT₃) receptors and chemically, it is [R-(R*, R*)]-2-(1-Azabicyclo[2.2.2]oct-3-yl)-2,3,3a,4,5,6-hexahydro-1H-benz[de]isoquinolin-1-one. It is used in prevention of acute and delayed nausea and vomiting associated with initial and repeat

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courses of moderately emetogenic cancer chemotherapy. Palonosetron is administered intravenously, as a single dose, 30 minutes before chemotherapy, or as a single oral capsule one hour before chemotherapy.



Structure of palonosetron hydrochloride

Literature survey reveals that palonosetron hydrochloride can be estimated by HPLC method¹⁻³. However, there is no U.V. spectrophotometric method reported for the estimation of palonosetron hydrochloride from pharmaceutical dosage forms. Present work describes a simple, economical, accurate and precise method for the estimation of palonosetron hydrochloride in tablet formulations.

EXPERIMENTAL

Instrument

A double beam JASCO 530 U.V.-Visible spectrophotometer, with spectral band width of 2 nm and wavelength accuracy ± 0.5 nm was used. A pair of 1 cm matched quartz cells was used to measure absorbance of the resulting solution.

Materials

Pure drug, palonosetron was supplied as a gift sample by CIPLA Limited. Tablet formulations containing palonosetron of the brand names Palzen of Dr. Reddys, Hyderabad, Palnox of Glenmark were purchased from local pharmacy shop.

Solvents: Different solvents were tried like methanol, ethanol, acetonitrile and water. Ethanol was used as the solvent of choice as it gave smooth and highest absorbance.

Stock solution: Standard stock solution were prepared by weighing out 100 mg of palonosetron and transferred to 100 mL volumetric flask. It was dissolved in ethanol (A.R grade) and made upto volume to get a concentration of 1 mg/mL. Spectral characteristics of

palonosetron were studied by taking concentrations of 10, 20, 30, $\mu\text{g/mL}$ and scanned by U.V.-Visible spectrophotometer from 190-400 nm and λ_{max} of 255 nm was fixed (Fig. 1).

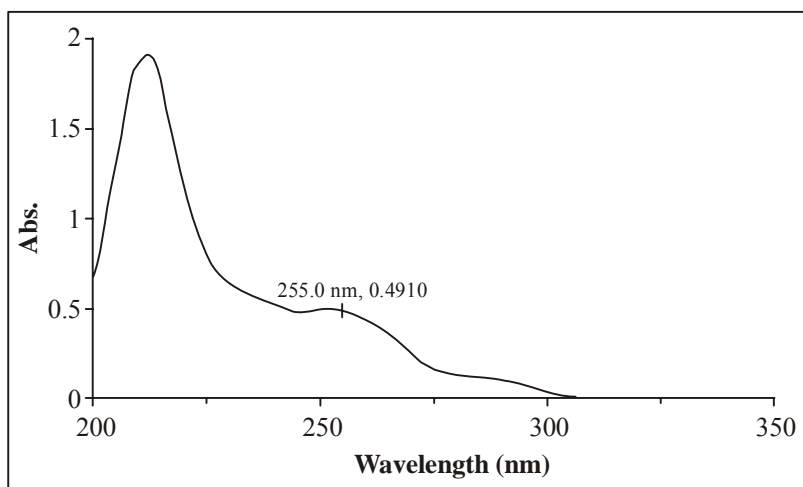


Fig. 1: UV spectra of palonosetron in ethanol

Calibration curve of absorbance versus concentration was drawn by taking concentrations ranging between 1-40 $\mu\text{g/mL}$ and data revealed that Beer's law was obeyed between concentration range of 7.5-25 $\mu\text{g/mL}$. Calibration curve of palonosetron is given in Fig. 2.

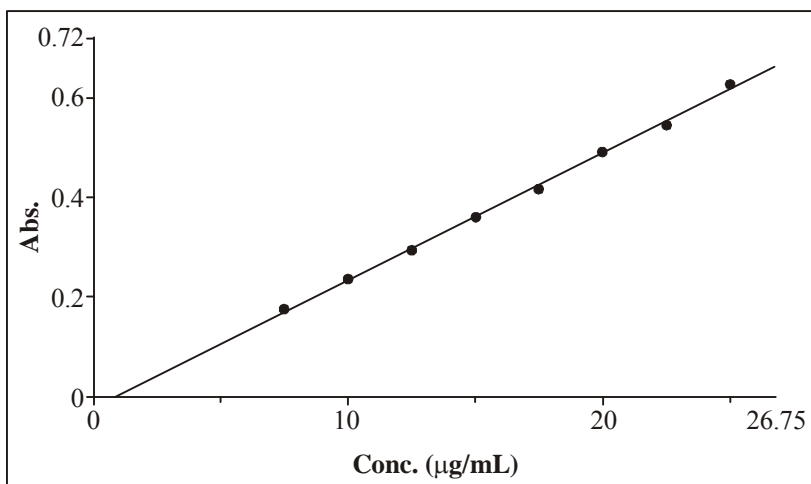


Fig. 2: Calibration curve of palonosetron

Assay of palonosetron in dosage forms

Weight equivalent to 100 mg was transferred to 100 mL volumetric flask and made up to volume with ethanol. It was sonicated for 15 minutes and mixed. The resultant 1 mg/mL of the solution was further diluted to get a concentration of 100 µg/mL. Accurately 1, 1.5 and 2 mL of the above solution were pipetted out into three 10 mL standard flasks and the volumes were made up using ethanol. This gave sample solution having concentration 10, 15, and 20 µg/mL, respectively. The absorbance of each concentration was measured and the results of analysis of tablet formulations are shown in Table 1.

Table 1: Result of tablet analysis

Brand of drug	Label claim	Amount of drug estimated	Percentage label claim	Standard deviation
PALZEN	25 mg	24.87	98.99%	0.02%
PALNOX	25 mg	24.92	99.12%	0.04%

Validation^{4,5}

The method is validated with respect to linearity, accuracy, precision and sensitivity.

Accuracy

To study the accuracy of the proposed methods, recovery studies were carried out by adding a known amount of drug to the pre-analyzed tablet powder and percentage recoveries were calculated. The result of recovery studies were satisfactory and are presented in Table 2.

Table 2: Result of recovery studies

Brand of drug	Label claim	Amount of pure drug added	Percentage recovery*	Standard deviation
PALZEN	25 mg	50 mg	99.25%	0.5%
PALNOX	25 mg	50 mg	99.35%	0.28%

*Mean of 3 determinations

Precision

The reproducibility of the proposed method was determined by performing the tablet assay at different time intervals on the same day (intra-day assay precision) and on three different days (inter-day assay precision). The results of intra-day and inter-day precisions were expressed in % RSD. The % RSD for intra-day assay precision was found to be 0.4 and inter-day assay precision was found to be 0.6.

Standard sensitivity

The standard sensitivity of the method was calculated, lowest range/1000 and it was 0.0075 µg.

Linearity

The linearity of analytical procedure is its ability to obtain the best results, which is directly proportional to the concentration of analyte in the sample. The calibration curve of palonosetron by the proposed method was found to be linear in the range of 7.5-25 µg/mL.

RESULTS AND DISCUSSION

The method discussed in the present work provides a simple, accurate, economical and convenient method for the analysis of palonosetron using U.V. spectrophotometry. λ_{max} selected for quantitation was 255 nm. In the developed method, the linearity was observed in the concentration of 7.5-25 µg/mL. Present label claim for the two brands of palonosetron at concentrations and 25 mg was found in the range of 98.99-99.12%. Accuracy of the proposed method was ascertained by recovery studies and the results were expressed as percent recovery and were found in the range of 99.25-99.35%. Values of standard deviation and coefficient of variance was satisfactorily low indicating the accuracy of both the methods. Intra-day and Inter-day precision studies were carried out by analyzing the tablet powder at different time interval on the same day and on three different days, respectively. Standard deviation and coefficient of variance for Intra-day and Inter-day precision studies was found to be less than 2 indicating precision of the proposed method. The standard sensitivity of the method was calculated as 0.0075 µg. Based on the results obtained, it was found that the proposed method was accurate, precise, sensitive, reproducible and economical and can be employed for routine quality control of palonosetron in tablet dosage forms.

ACKNOWLEDGEMENT

Authors are thankful to CIPLA Limited for providing the gift samples.

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Revised : 03.08.2011

Accepted : 05.08.2011