

## Three-wavelength Spectrophotometric Method for Simultaneous Estimation of Pantoprazole and Domperidone in Pharmaceutical Preparations

R.B. Kakde\*, S.N. Gedam, N.K. Chaudhary, A.G. Barsagade, D.L. Kale and A.V. Kasture  
Department of Pharmaceutical Sciences, RTM Nagpur University,  
Amravati Road, Nagpur – 440 033, Maharashtra, India.  
E-Mail: drkakde@yahoo.com

**Abstract :** Three-wavelength spectrophotometric method has been developed for the simultaneous estimation of pantoprazole (PAN) and domperidone (DOM) in pharmaceutical preparations. The absorbance value at 331nm was used for the estimation of PAN where DOM showed zero absorbance. The absorbance value for DOM was estimated by taking difference of absorbance at two wavelengths 284 nm and 364.5nm. These method obeyed Beer's law in the concentration range of 10-50 µg/ml for PAN, DOM and their mixture. The results of analysis have been validated statistically and recovery studies confirmed the accuracy of the proposed method. The method was found to be simple, rapid and accurate. Hence can be used for routine simultaneous estimation of these drugs in formulations.

**Keywords:** Three-wavelength Spectrophotometry, Pantoprazole, Domperidone.

### Introduction

Pantoprazole is an anti-ulcerative drug and used in the treatment of peptic ulcer and gastro-esophageal reflux disease (GERD). Chemically it is 5-(difluoromethoxy)-2-[(3,4-dimethoxy-2-pyridinyl) methyl]sulfinyl]-1H-benzimidazole. Literature described HPLC<sup>1,2</sup>, RP-HPLC<sup>3</sup> for determination of enantiomer, capillary electrophoresis<sup>4</sup>, difference spectrophotometry<sup>5</sup> were reported for determination of PAN in plasma and pharmaceutical preparations.

Domperidone is a prokinetic agent. It is used as an antiemetic for short-term treatment of nausea and vomiting of various etiologies including those associated with cancer therapy. Chemically it is 5-chloro-1-[1-[3-(2,3-dihydro-2-oxo-1H-benzimidazol-1-yl)propyl]-4-piperidinyl]-1,3-dihydro-2H-benzimidazol-2-one. It is official in BP<sup>6</sup>, HPLC<sup>7</sup>, HPTLC<sup>8</sup>, extractive spectrophotometry<sup>9</sup>, first derivative spectrophotometry<sup>10</sup> were reported for the estimation of DOM in pharmaceutical preparation and RP-HPLC<sup>11,12</sup>, spectrophotometry<sup>13</sup>, HPLC<sup>14</sup> were reported for the estimation of domperidone in combination with other drugs.

Methods available for simultaneous estimation of PAN and DOM in pharmaceutical preparations are spectrophotometric<sup>15</sup>, HPLC<sup>16,17</sup> and HPTLC<sup>15,17</sup> methods.

The proposed method is suitable for the estimation of drugs in standard laboratory mixture as well as marketed preparations and dissolution studies.

### Experimental

#### Materials and Equipments

Pure PAN and DOM were obtained from Torrent Pharmaceuticals, Sun Pharma and Cadila Pharmaceuticals. The commercial fixed dose combination products *Pantocid D* and *Topdom* both containing 20 mg PAN and 10 mg DOM were procured from the local market.

Methanol AR grade was purchased from Ranbaxy Chemicals, India. All other reagents used were of AR grade. Distilled water was used during the entire experiment.

Shimadzu 2401 double beam UV-spectrophotometer with 1.0 cm matched pair quartz cells were used for the measurement of absorbance. Mettler toledo electronic balance was used for weighing the samples.

#### Procedure

##### Preparation of standard stock solutions

Standard stock solutions of PAN and DOM (1 mg/ml) were prepared separately in methanol.

##### Determination of $\lambda_{max}$

Aliquot portion of the standard stock solutions were diluted suitably with 0.1M HCl to obtain 10 µg/ml working standard solutions of PAN and DOM. Working

standard of PAN, DOM and their laboratory mixture prepared in a similar manner were then scanned in the wavelength range of 200-400 nm in a 1.0 cm cell against reagent blank. The overlain spectra of PAN and DOM and their mixture are shown in Fig 1. From these spectra, the wavelength of 331 nm was selected for the estimation of PAN as DOM showed zero absorbance at this wavelength whereas the wavelengths 284 nm and 364.5 nm were utilized for estimation of DOM by taking the difference of absorbance between the two.

#### Preparation of calibration curve

Standard stock solutions of both the drugs and their standard laboratory mixture were diluted suitably with 0.1 M HCl to obtain a series of known concentrations. Absorbances of series of PAN solutions were measured at 284, 331 and 364.5 nm, series of DOM solutions at 284-364.5 nm and 284 nm whereas the series of their standard laboratory mixture at 284, 331 and 364.5 nm. These series of absorbances were plotted versus concentration to obtain the calibration graphs. From these calibration curves, the linearity range was found to be 0-50 µg/ml for PAN, DOM as well as their mixture.

#### Analysis of the marketed formulation

##### (a) Preparation of mixed standard solution

Weigh accurately about 50 mg of PAN and 25 mg of DOM and transfer in a 100 ml volumetric flask. Dissolve with 25 ml of methanol and make volume upto the mark. Aliquot portion of the solution was diluted suitably with 0.1M HCl to obtain concentration of 50 µg/ml of PAN and 25 µg/ml of DOM.

##### (b) Preparation of sample solution

Twenty capsules were emptied, their contents weighed accurately and powdered. An accurately weighed powder equivalent to 50 mg of PAN and 25 mg of DOM was taken in a 100 ml volumetric flask, dissolved with little methanol, agitated for 20 min on a shaker, sonicated for 15 min and then made up to the volume. This methanolic solution was then filtered using Whatmann (Grade-I) filter paper. Aliquot portion of the filtrate was diluted suitably with 0.1M HCl to obtain concentration of 50 µg/ml of PAN and 25 µg/ml of DOM.

The absorbance of mixed standard solution and marketed formulation were read at three wavelengths. The contents of PAN and DOM in capsule were estimated by comparing the absorbance with those of the mixed standard solution. The results of assay are given in Table1.

#### Recovery studies

To determine the accuracy of the method, recovery study was performed by standard addition method. To the preanalyzed capsule powder equivalent to 25 mg of PAN, known quantities of standard drug were added separately at three spiking levels i.e., 80, 100 and 120 %. The total drug contents were determined as for formulations. The percentage recovery was determined and the results are given in Table1.

#### Results and Discussion

Both the drugs and their mixture obeyed Beer-Lambert's law in the range of 0-50 µg/ml. Commercial formulations containing PAN and DOM were analyzed by proposed method. Five replicate analysis of each formulation were carried out and the mean assay values in two formulations *Pantocid D* and *Topdom* were found to be  $99.00 \pm 0.480$ ,  $99.22 \pm 0.618$  of PAN respectively and  $100.24 \pm 1.073$ ,  $99.17 \pm 0.723$  of DOM respectively. The corresponding RSD values indicated that the method has required precision. The accuracy of the method was determined by recovery studies. Pure PAN and DOM was added to the preanalyzed capsule powder at three spiking levels viz 80, 100, 120 % of weight of preanalyzed capsule powder taken. Two replicate analyses were carried out at each level. The mean recovery was found to be  $99.83 \pm 1.459$ ,  $99.94 \pm 1.749$  % for PAN and DOM respectively in *Pantocid D* and  $99.48 \pm 0.982$ ,  $99.67 \pm 1.247$  % for PAN and DOM respectively in *Topdom* in indicating the accuracy and non-interference by the excipients to the method developed.

Thus, the developed method is simple, accurate, and precise. Hence, it can be used for routine estimation of PAN and DOM in combined pharmaceutical preparations and dissolution studies.

**Table1: Results of recovery studies and assay in marketed formulations**

Formulation	Ingredients	Labeled claim	% Labeled claim* $\pm$ SD	% RSD	% Recovery ** $\pm$ SD	% RSD
Pantocid D	PAN	20	$99.00 \pm 0.480$	0.485	$99.48 \pm 0.981$	0.981
	DOM	10	$100.24 \pm 1.073$	1.070	$99.67 \pm 1.247$	1.251
Topdom	PAN	20	$99.22 \pm 0.618$	0.623	$99.83 \pm 1.459$	1.461
	DOM	10	$99.17 \pm 0.723$	0.729	$99.94 \pm 1.749$	1.750

\*Mean of five determinations

\*\*Mean of six determinations

SD = Standard deviation

RSD = Relative standard deviation

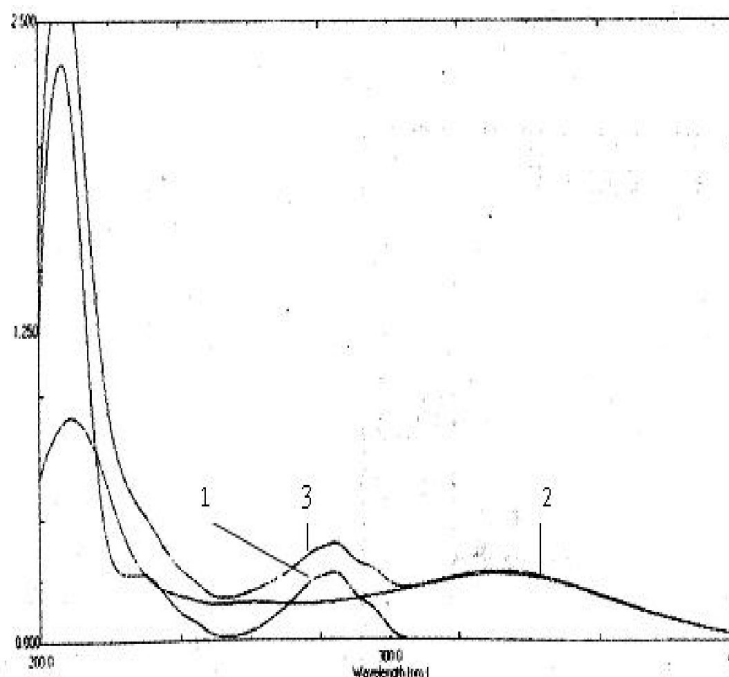


Fig.1: Overlain spectra of (1) DOM, (2) PAN and (3) Mixed standard.

### Acknowledgements

The authors extend their sincere thanks to Torrent Pharmaceuticals, Sun Pharma and Cadila Pharmaceuticals for providing gift sample of pure PAN and DOM. We also extend our thanks to HOD, Department of Pharmaceutical Sciences, RTM Nagpur University for providing the necessary facilities.

### References

- Mansour A.M. and Sorour O.M., High-performance liquid chromatographic determination of pantoprazole in tablet dosage form, *Chromatographia*, 2001,53, 478-479.
- Xiaolan J., Dongling L. and Buoxia Y., Determination of pantoprazole in plasma by HPLC, *Zhongguo Yaoxue Zazhi*, 1999, 34, 433-485.
- Tanaka M and Yamazaki H., Direct determination of pantoprazole enantiomers in human serum by reversed phase high-performance liquid chromatography using a cellulose-based chiral stationary phase and column switching system as a sample cleanup procedure, *Anal. Chem.*, 1996,68,1513-1516.
- Eberle D., Hunmel R.P. and Kuhm R.J., Chiral resolution of pantoprazole sodium and related sulfoxides by complex formation with bovine serum albumin in capillary electrophoresis, *J. Chromatogr. A*, 1997,75,185-192.
- Mashru R.C., and Patel P.M., UV spectrophotometric method for estimation of Pantoprazole in bulk and dosage form, *Indian Drugs*, 2003,40,300-301.
- British Pharmacopoeia, H.M. Stationery Office, London, 1993, I,324-345.
- Sadana G.S. and Potdar A., HPLC method for estimation of domperidone in pharmaceutical preparations, *Indian J. Pharm. Sci.*, 1992, 54,162-164.
- Zarapkar S.S. and Salunke B.B., Determination of domperidone by high performance thin layer chromatography in pharmaceutical preparations, *Indian Drugs*, 1990,27, 537-544.
- Mohan Y.R. and Avadhnanula A.B., Extractive spectrophotometric determination of domperidone in its pharmaceutical dosage forms, *Indian Drugs*, 1998, 35, 754-756.
- Mohmend M.E., Al-khamis H.A., Al-Aroudi M. and Al-khamis K.J., First-derivative UV spectrophotometric assay of domperidone, *Farmaco*, 1989,44, 1045-1052.
- Zarapkar S.S., Bhandari N.P. and Halker O.R., Determination of cinnarizine and domperidone maleate in tablets by RP-HPLC, *Indian Drugs*, 2000, 37, 295-298.
- Zarapkar S.S. and Kanyawar N.S., Simultaneous estimation of domperidone and omeprazole in pharmaceutical dosage by reverse phase high performance liquid chromatography, *Indian Drugs*, 2002, 39, 217-221.

13. Rao G.R., Rajgopala K.G., Avadhnanula A.B. and Vastu P.K.; Spectrophotometric estimation of domperidone and omeprazole in pharmaceutical dosage by RP-HPLC, East Pharm., 1990,33, 133-135.
14. Singhri and Inderjeet, Spectrophotometric and HPLC methods for estimation of domperidone and cinnarizine in tablet formulation, Res. J. Chem. Environ., 2000,4, 63-67.
15. Kakde R.B., Gedam S.N. and Kasture A.V., Spectrophotometric and HPTLC method for simultaneous estimation of pantoprazole and domperidone in their pharmaceutical preparations, Asian J. Chem., 2006, 18, 1347-1351.
16. Sivakumar T., Manavalan R., and Valliappan K., Development and validation of a reversed-phase HPLC method for simultaneous determination of domperidone and pantoprazole in pharmaceutical dosage forms, Acta Chromatographica, 2007,18, 130-142.
17. Patel B.H., Suhagia B.N., Patel M.M. and Patel J.R., Simultaneous estimation of pantoprazole and domperidone in pure powder and a pharmaceutical formulation by high-performance liquid chromatography and high-performance thin-layer chromatography methods, J. AOAC Int., 2007, 90, 142-146.

\*\*\*\*\*