Simultaneous Spectrophotometric Estimation of Phenylpropanolamine HCl, Bromhexine HCl and Chlorpheniramine Maleate

S.K. PANDA AND A.K. SHARMA*
Department of Pharmacy, S.G.S.I.T.S, 23, Park Road, Indore-452003 (M.P.)

Accepted 6 February 1999
Received 10 september 1997

Present communication deals with simultaneous analysis of three component formulation containing phenylpropanolamine HCl [PPA], bromhexine HCl [BH] and chlorpheniramine maleate [CPM], by multicomponent analysis method. PPA, BH and CPM showed linearity with absorbances in the range of 0-1000 µg/ml, 0-80 µg/ml and 0-60 µg/ml at the corresponding sampling wavelengths 257 nm, 305 nm and 272 nm respectively. The results obtained in analysis of syrup samples have been statistically validated and were found satisfactory. The method is simple, accurate and rapid.

Phenylpropanolamine (PPA) is a sympathomimetic agent primarily used in symptomatic relief of nasal congestion[1]. Bromhexine (BH) is a mucolytic drug used as an expectorant and chlorpheniramine maleate (CPM) is an antihistaminic drug used in allergic and vasomotor rhinitis[2], Fixed combination of PPA (25 mg), BH (8 mg) and CPM (4 mg) per 10 ml are marketed as syrup formulation. The combination is used for the treatment of cough and cold.

A HPLC method is official for PPA in USP[3] for its estimation in formulation. BP[4,5] specifies a spectrophotometric determination of BH in tablets. CPM is estimated by spectrophotometer method in tablets and syrup in IP[6,7]. The other reported methods available in literature for analysis of individual drug, in combination in formulations and biological fluids include spectrophotometry, HPLC, potentiometry and GLC[8-13]. The PPA, BH and CPM is an unofficial combination for which no method is reported in the literature.

A Shimadzu UV/Vis. recording spectrophotometer (Model : 160A) with 2 nm spectral bandwidth was employed for all spectrophotometric measurement using a pair of 10 mm matched quartz cells. PPA (B.P.), BH (B.P.), CPM (I.P.) (Piramal Health Care), hydrochloric acid (Ranbaxy, AR Grade), chloroform (Ranbaxy, AR Grade), sodium hydroxide (Qualigens, Excelr) and double distilled water were used in present investigation.

Stock solutions of PPA, BH and CPM were prepared by dissolving 500 mg, 100 and 50 mg respectively in 100 ml of 0.1 N HCl. Finally, standard drug solutions of 1000 µg/ml, 100 µg/ml and 100 µg/ml of PPA, BH and CPM were prepared by further dilution. PPA, BH and CPM showed linearity with absorbances in the range of 0-1000 µg/ml, 0-80 µg/ml and 0-60 µg/ml respectively and was validated by least square method.

The absorbance maxima of PPA (257 nm), BH (245 nm) and CPM (265 nm) were used for the multicomponent analysis. The results showed wide variance. After repeated experimentation, 257 nm, 305 nm and 272 nm were selected as the wavelengths for the analysis of PPA, BH and CPM respectively. Eight different mixed standards were prepared from stock solutions of 1000 µg/ml of PPA, 100 µg/ml of CPM and 100 µg/ml of BH (Table I). Before analysing the selected syrup formulation, the method was validated by analysing physical admixtures prepared in the laboratory, containing PPA, CPM and BH in the ratio of each component as in the formulation in consideration and random samples were also prepared (Fig. 2) The results were validated statistically.

Two batches of syrup formulations containing 25 mg, 8 mg and 4 mg of PPA, BH and CPM respectively per 10 ml of syrup were used for analysis by the proposed method. Ten ml of the syrup was taken and made

*For correspondence

Table 1 - Concentration of PPA, CPM and BH in mixed Standards

Mixed Std. No.	I	II	III	IV	V	VI	VII	VIII
Conc. of PPA (µg/ml)	25	50	75	100	125	125	00	00
Conc. of CPM (µg/ml)	04	08	12	16	20	00	20	00
Conc. of BH (µg/ml)	08	16	24	32	40	00	00	40

Table 2 - Analysis of Samples of Syrup Formulation

Syrup	Label claim (mg/10 ml)			Found (mg/10 ml)			Per cent found		
	PPA	CPM	BH	PPA	CPM	BH	PPA	CPM	BH
B-I	25	04	08	24.17	4.13	8.08	98.68	103.29	101.0
B-II	25	04	08	24.76	4.08	8.06	99.07	102.21	100.8

Table 3 - Statistical Analysis of Results of PPA, CPM and BH

	Batch I			Batch II		
Drug	PPA	CPM	BH	PPA	CPM	BH
% Mean*	98.76	101.36	98.54	99.49	96.73	96.58
S.D.	1.167	0.706	1.878	1.527	0.935	1.584
C.O.V.	1.181	0.683	1.906	1.535	0.976	1.640
S.E.	0.528	0.315	0.839	0.683	0.418	0.708

* Average of six observations

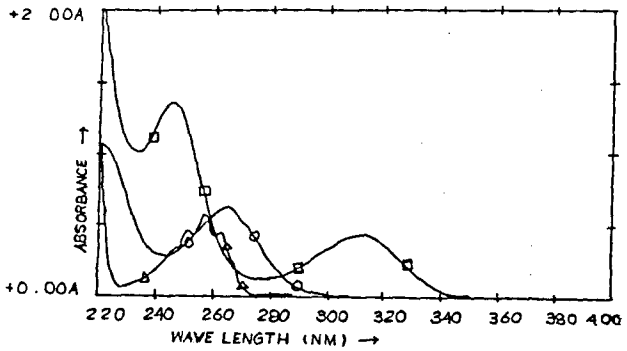

Fig. 1 : Overlain spectra of PPA, CPM and BH Absorbance spectra obtained at different wavelengths in the range of 220-400 nm of PPA (Δ), BH (□) and CPM (O) overlain over each other

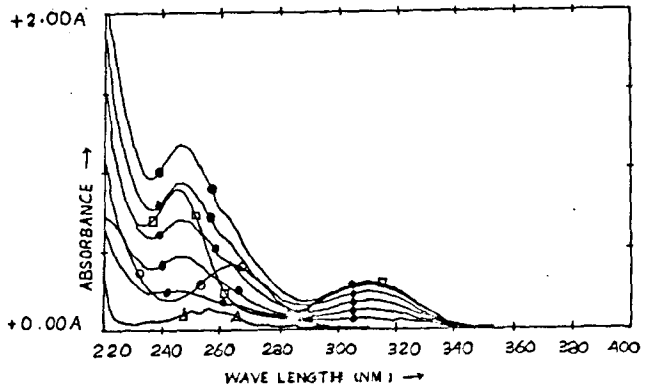

Fig. 2 : Overlain spectra of mixed standards of PPA, (Δ), CPM (O) and BH (□)

alkaline with 5 ml of N NaOH. The resulting solution was successfully extracted from chloroform (15 ml, 10 ml, 10 ml and 10 ml) and collected extracts were evaporated under reduced pressure. The residue was dissolved in 0.1 N HCl and volume was made upto 100 ml and was treated as stock solution labeled to contain 250 µg/ml, 80 µg/ml and 40 µg/ml of PPA, BH and CPM respectively. Different dilutions were prepared and analysed as per procedure used for mixed standards (Table 2). The results were validated statistically (Table 3). Preanalysed samples of syrups were taken to which different amounts of standard solutions of PPA, BH and CPM were added and analysed to study recovery of drugs by proposed method.

The proposed method is a simple method developed for simultaneous analysis of PPA, BH and CPM in syrup formulation. Three sampling wavelengths 257 nm, 305 nm and 272 nm were used for analysis. The proposed method of analysis was validated by analyzing the laboratory prepared samples. The results were satisfactory. Two batches of syrup used for analysis have shown standard deviation of PPA, BH and CPM 1.167, 1.878 and 0.706 respectively for first batch and 1.527, 1.584 and 0.935 respectively for second batch. The results conform that proposed method is simple, accurate, precise and efficient. This conclusion is also supported by satisfactory coefficient of variance and standard error.

ACKNOWLEDGEMENTS

The authors acknowledge with thanks the gift samples of drugs provided by M/s. Piramal Health Care, Pithampur, District Dhar (M.P.) We also thank the Director S.G.S.I.T.S, Indore and the Head, Department of Pharmacy, S.G.S.I.T.S, Indore for providing necessary facilities for the above investigation.

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