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NOTE

Spectrophotometric Determination of Aceclofenac and Tizanidine Hydrochloride

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A simple rapid, accurate, economical and sensitive spectrophotometric method for the determination of aceclofenac and tizanidine hydrochloride in combined dosage forms has been developed. The method is based on the additivity of absorbances. Aceclofenac shows absorption maxima at 273.5 nm and tizanidine shows absorption maxima at 319.5 nm in phosphate buffer pH 7.4. Beer Lambert's law is obeyed for both the drugs in the concentration range 5-45 µg/mL. The accuracy and reproducibility of the proposed method was statistically validated by recovery studies.

Key Words: Spectrophotometric determination, Aceclofenac, Tizanidine hydrochloride.

Aceclofenac[1] is 2-[(2,6-dichlorophenyl)amino]benzoic acid carboxy methyl ester used as an analgesic and non-steroidal antiinflammatory drug. A survey of the literature revealed that HPLC[2], densitometric[3], spectrofluorimetric[4] and colorimetric[5] methods have been reported for the estimation of aceclofenac in pharmaceutical dosage forms. Tizanidine hydrochloride[6,7] is 2,1,3-benzathiadiazol-4-amine,5-chloro-N-(4,5-dihydro-1H-imidazole-2-yl)monohydrochloride, used as a central muscle relaxant. In analytical abstract, differential colorimetry and differential pulse polarography methods are reported for its estimation[8]. Although aceclofenac and tizanidine are commonly used in dual drug therapy as a potent antiinflammatory and central muscle relaxant, yet no method is so far reported for their simultaneous estimation. A successful attempt has been made to estimate two drugs simultaneously by spectrophotometric analysis.

The Shimadzu Pharmaspec 1700 UV-Visible spectrophotometer with 10 mm matched quartz cells was used for experiments. The chemicals used were of analytical grade.

Preparation of standard solutions: Solution of aceclofenac and tizanidine hydrochloride were prepared by dissolving 100 mg each

(accurately weighed) of standard aceclofenac and standard tizanidine in 100 mL pH 7.4 phosphate buffer solution. Working standard solutions (A) and (B) were further prepared by taking 1 mL of stock solution of aceclofenac and tizanidine in 10 mL volumetric flasks and made up the volume with 7.4 buffer.

Methods of analysis: Overlain spectra of standard solutions of aceclofenac and tizanidine were scanned. Aceclofenac shows absorption maxima at 273.5 nm and tizanidine shows at 319.5 nm. The calibration curves for aceclofenac and tizanidine were prepared in the concentration range of 5-45 μg/mL at both the wavelengths *i.e.* 273.5 and 319.5 nm. The absorptivity coefficients were determined for both the drugs at both the wavelengths and following equations were made.

$$A_1 = 253.82\ Cx + 39.88\ Cy \quad (1)$$

$$A_2 = 475.71\ Cx \quad (2)$$

A_1 and A_2 are absorbances at 273.5 and 319.5 nm and Cx and Cy are concentrations of aceclofenac and tizanidine hydrochloride, respectively.

Estimation from laboratory mixture: In the laboratory, series of mixtures in different concentration of both the drugs were prepared (Table-1), scanned all the solution in the range of 200 to 400 nm against pH 7.4 phosphate buffer as blank and the absorbance were taken at different wavelengths as stated above. Using the eqns. 1 and 2 the concentrations were determined.

TABLE-1
RECOVERY STUDIES

Drug in standard mixture solution (μg/mL)		% Recovery ± SD		Coefficient of variance (%)		Percentage range of error with in 95 % Confidence limit	
Ace	Tiz	Ace	Tiz	Ace	Tiz	Ace	Tiz
5	5	99.87 ± 0.01	99.60 ± 0.02	0.0100	0.0117	± 0.0149	± 0.1163
10	10	99.09 ± 0.51	99.78 ± 0.14	0.0104	0.4265	± 0.1274	± 0.2175
15	15	98.97 ± 0.89	98.61 ± 0.09	0.1207	0.3641	± 0.0987	± 0.1237
20	20	99.54 ± 0.97	99.94 ± 0.57	0.2374	0.5869	± 0.1974	± 0.9875
25	25	99.37 ± 0.12	99.89 ± 0.04	0.4125	0.1245	± 0.0989	± 0.0163
30	30	99.19 ± 0.21	99.24 ± 0.10	0.0892	0.3125	± 0.1452	± 0.9945

The results are mean of six readings (n = 6)
Ace: Aceclofenac; Tiz: Tizanidine hydrochloride.

The proposed method for simultaneous estimation of aceclofenac and tizanidine in combined sample solutions was found to be simple, accurate and reproducible. Accuracy of the analysis was determined by performing recovery studies of aceclofenac and tizanidine by the proposed method by using different combinations of standard drug solution of both the drugs. Results of recovery studies were indicating that the method is accurate and

reproducible. The content of the aceclofenac and tizanidine was directly found from the eqns. 1 and 2. The reproducibility, repeatability and accuracy of the proposed method were found to be good which is evidenced by low values of standard deviation and percent relative standard deviation (Table-1). The percent range of error (within 95 % confidence limits) shows precision of the methods. Thus it can be concluded that the method developed in the present investigation is simple, sensitive, accurate and precise. Hence, this can be successfully applied for simultaneous estimation of both the drugs.

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