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Spectrophotometric Estimation of Benazepril by Calibration Curve Method

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ABSTRACT

The objective of this work was to develop and validate simple, rapid and accurate spectrophotometric method for quantitative estimation of Benazepril in pure drug. Benazepril is used for management of hypertension, heart failure, myocardial infarction. In methanol Benazepril exhibits absorption at 242.4 nm and method obeys Beer's law at the concentration range of 2.0-100 µg/mL. The percentage label claim was found in the range of 98-103%. The proposed method was validated statistically and by recovery studies.

Keywords: UV Spectrophotometer, Calibration curve method, Benazepril tablet

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INTRODUCTION

Benazepril, Chemically (3S) - 3 - [[(1S)1-(ethoxycarbonyl) - 3 - phenylpropyl]amino] - 2,3,4,5 - tetrahydro - 2 - oxo - 1 - H - 1benzazepine - 1 - acetic acid(Fig 1). Benazepril is used for management of hypertension, heart failure, myocardial infraction.[3] Literature survey revealed that other UV method for the determination of Benazepril[4] and HPLC Method are available for estimation of Benazepril alone and in Combinations with other drugs. Therefore, it was thought worthwhile to develop simple, accurate and reliable spectrophotometric method for estimation of Benazepril in bulk form using methanol as a solvent. All the chemicals used were of analytical grade. Spectral and absorbance measurement were made on Systronics Double beam UV-Visible spectrophotometer 2203 with 10 mm matched quartz cells.

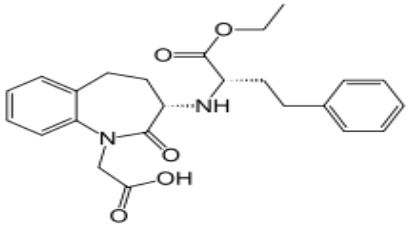

Figure 1: Structure of Benazepril

MATERIALS AND METHODS

Pure sample of Benazepril was obtained from Emcure pharmaceutical industry, Bhosari, Pune, as a gift sample. Methanol AR grade (Merck Ltd, Mumbai, India) was used as solvent. Shimadzu UV-1800 UV/VIS spectrophotometer was used with 1 cm matched quartz cells and UVProbe 2.35 software. Tablets of 10 mg strength were procured from local pharmacy of commercial brands Benace10 (ENCORE Healthcare pvt. Ltd., Aurangabad, India).

Preparation of standard solution

An accurately weighed 100 mg of Benazepril pure drug was dissolved in methanol to give stock solutions of drug 1000 µg/mL concentration. From this stock solution, working standard solution of drug (2.0-100 µg/mL) were prepared by appropriate dilutions with same solvent. Working standard solutions were scanned in UV range of (200- 400nm)

Analysis of tablet formulation

Twenty tablets of Benazepril were triturated and mixed thoroughly. Accurately weighed quantity of tablet powder equivalent to 10 mg of Benazepril was transferred in 100 ml volumetric flask. Add 50 ml methanol and sonicate for 10 min. The resultant solution was filtered through 0.45µ membrane filter and finally diluted to volume with methanol. The absorbance of resultant solution was measured at 242.4 nm.

Linearity

Standard stock solution was diluted with methanol so as to get different solutions i. e. 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100µg/ml. The absorbances were recorded at 242.4 nm and were found to be linear in concentration range 2-100 µg/ml. The linearity was calculated by the least square regression method as shown in figure. 2.

Accuracy

To check the accuracy of the proposed method, recovery studies were carried out by applying standard addition method. A known amount of standard Benazepril, corresponding to 80, 100 and 120% of the label claim was added to pre-analysed sample of tablet. The recovery studies were carried out in triplicate at each level.

Precision

Precision of analytical method is expressed in relative standard deviation (RSD) of a series of measurements. The intra-day and inter-day precisions of the proposed methods were determined by estimating the corresponding responses (i.e. three concentrations / three replicates each) of the sample solution on the same day and on three different days respectively.

RESULTS AND DISCUSSION

The optical characteristics such as Beer's law limits, regression equation and correlation coefficient were calculated and results are presented in Table 1.

Table 1: Optical Characteristics and Precision of the proposed method

Parameters	Results
Wavelength	242.4 nm
Beer's law limit (µg/mL)	2.0-100
Regression equation (Y= mx+C)	Y=0.021x + 0.065
E 1%	348.6
Slope (m)	0.021
Intercept (C)	0.065
Correlation Coefficient (r^2)	0.996
Precision (n = 3)	
Intra-day* (% estimated ± S.D.)	98.95±0.4974
Inter-day* (% estimated ± S.D.)	99.99±0.3715

SD is standard deviation, * indicates mean of three replicates

In methanol, Benazepril exhibits absorption at 242.4 nm. The linearity was observed in concentration range of 2.0-100 µg/mL. The amount of Benazepril estimated by proposed method was in good agreement with the label claim. The accuracy of proposed method was checked by recovery studies, by addition of standard drug solution to pre analyzed drug solution at three different concentration levels within the range of linearity for both the drugs. Results for assay of

Benazepril as shown in Table 2.

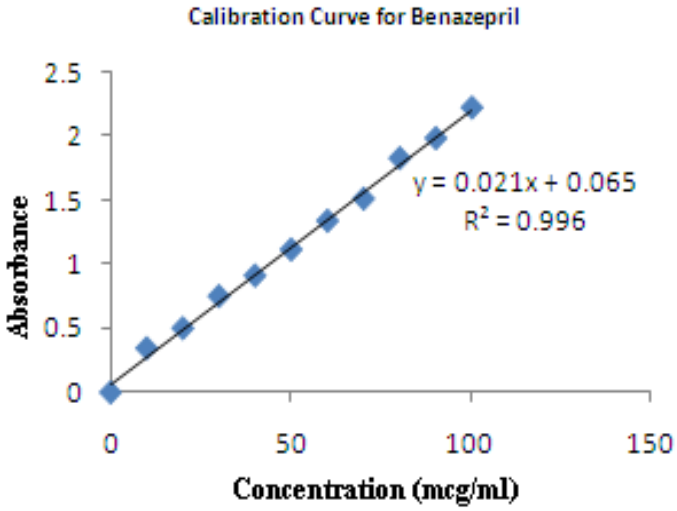

Figure 2: Calibration curve of Benazepril

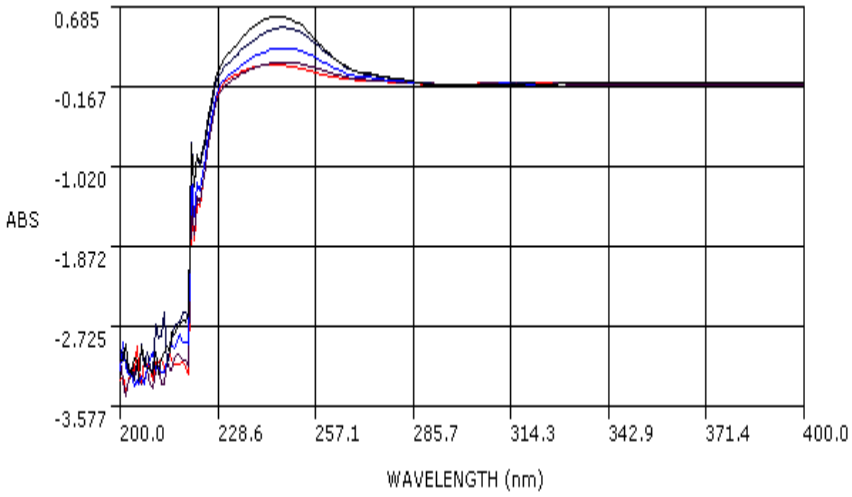

Figure 3: Overlain Spectra of Benazepril

Table 2: Result of Assay of Benazepril

A Label claim mg/tab	*Amount found mg/tab	% label claim (% ± S.D.)	% RSD
10	9.992	99.92±2.4095	0.02411

*Average of 3 determinacy

a Benazepril 10mg Benace10 (ENCORE Healthcare pvt. Ltd., Aurangabad, India).

CONCLUSION

The proposed method is simple, accurate, economical, rapid and do not require any sophisticated instruments contrast to chromatographic method used in routine analysis of Benazepril in pure drug. The low % RSD value indicates that method is accurate. Hence it can be effectively

applied for the routine analysis of Benazepril in bulk drug & pharmaceuticals.

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