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# SIMULTANEOUS SPECTROPHOTOMETRIC DETERMINATION OF CARVEDILOL IN ITS DOSAGE FORM

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## ABSTRACT

The present investigation deals with the development of a new, simple, specific, sensitive, rapid and economical procedure for simultaneous estimation of Carvedilol in its dosage form. The method is based on the ultraviolet absorbance maxima of the above drug at 285 nm. The drug obeyed Beer's law in the concentration range of 4-36 µg/ml with molar absorptivity of 12.6x $10^3$ l/mol.cm in methanol. The proposed methods were successfully applied for the simultaneous determination of drug in commercial tablet preparations. The results of the analysis have been validated statistically and by recovery studies.

**INTRODUCTION:** Carvedilol, (CAR) is chemically 1-(9H-carbazole-4-yloxy)-3-[(2-(2-methoxyphenoxy) ethyl) amino]. It is a nonselective β-adrenergic blocker with $\alpha_1$- blocking activity [1]. It is used in hypotension [2]. Literature survey revealed that Flourimetric, HPLC, LC/MS, GC/MS, methods for estimation of CAR individually and in combination with other drugs. A RP-HPLC method of analysis was reported for simultaneous estimation of CAR in tablet formulation, since the reported RP-HPLC and LC/MS method is expensive and involves complicated sample preparation, the present work was undertaken for simultaneous estimation of CAR in tablet formulations by UV spectrophotometric method.

**MATERIALS AND METHODS:** A double-beam Shimadzu UV- Visible spectrophotometer (Model 1800), with spectral bandwidth of 2 nm, wavelength accuracy ±0.5nm and a pair of 1 cm matched quartz cells was used to measure absorbance of the resulting solution. Analytical grade solvents were used in the present study. A drug sample of carvedilol (CAR) was procured from M/s Aurobindo Pharma Ltd., Medak (A.P.). Commercial tablets of carvedilol were purchased from the local market.

**Determination of linearity range:** CAR was accurately weighed (100mg) and dissolved separately in 35 ml of methanol and the volume made up of 100 ml with water in a 100 ml volumetric flask. One milliliter of the above solutions was diluted separately to 10 ml with methanol in volumetric flask to give 100 µg/ml working standard solutions. These working standard solutions were further diluted for 10µg/ml. These dilutions were scanned in the UV region. CAR showed absorption maximum at 285 nm. The overlain spectrum for the above drug is represented in **Fig. 1**.

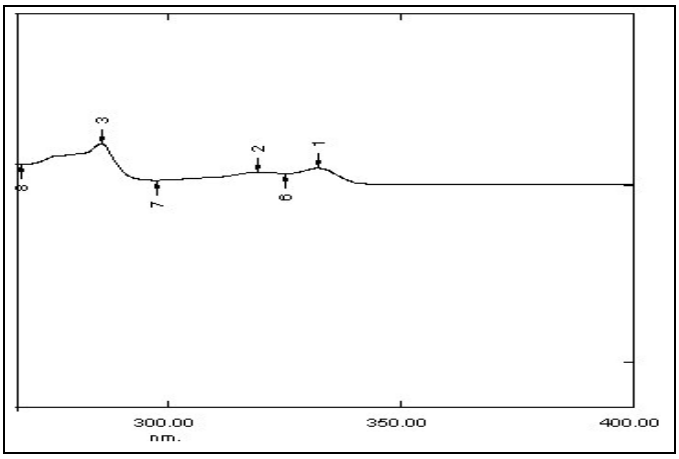


**FIG. 1: OVERLAIN SPECTRUM FOR THE CARVEDILOL**

CAR showed linearity range from 4-36 µg/ml at the selected wavelength. From the prepared dilutions a standard curve is plotted by determining the concentration using 285 nm wavelength (**Fig. 2**).

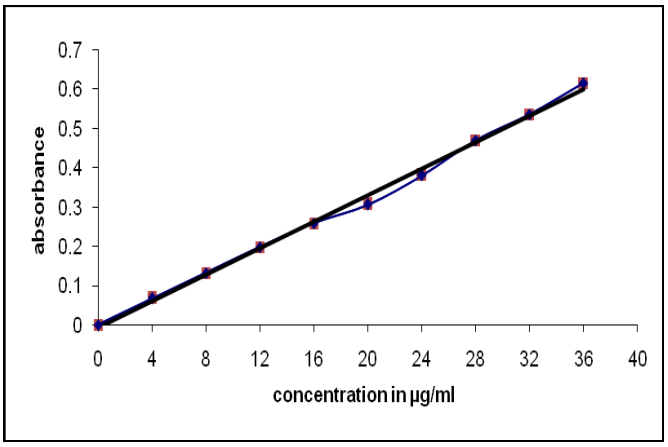


**FIG. 2: STANDARD CURVE OF CARVEDILOL**

**Analysis of carvedilol:** Commercial formulations, CAR-I and CAR-II were purchased from a local pharmacy. Twenty tablets of each brand containing 25 mg of CAR were weighed and finely powdered in a mortar. A quantity of powder equivalent to 100 mg of CAR was weighed accurately and dissolved in 10 ml of methanol and made up to 100 ml in a volumetric flask with water (1000 µg/ml). The solution was then filtered through whatmann filter paper to get a clear solution. From this 1 ml of solution was drawn and

make up to 10 ml with water. The formulation was estimated in one concentration range by diluting stock solutions to 36 µg/ml of CAR. The method was validated according to ICH guidelines.

**Recovery Studies:** Recovery studies were carried out at three different levels by adding 2.0, 4.0, 6.0 mg/ml of pure drug solution to different samples of tablet powder solution containing the equivalent 100 mg/ml of drug. From the amount of drug found, percentage recovery was calculated.

**RESULTS AND DISCUSSION:** The proposed method for determination of CAR showed molar absorptivity 12.6x $10^3$ l/mol.cm. Linear regression of absorbance on concentration gave the equation y = 0.0168x - 0.0067 with a correlation ($r^2$) of 0.9966 (**Table 1**).

**TABLE 1: OPTICAL CHARACTERISTICS AND PRECISION DATA OF CARVEDILOL**

| PARAMETERS | VALUE |
|---|---|
| Equation | y = 0.0168x - 0.0067 |
| $\lambda_{max}$ | 285 |
| Beer's law limit | 4-36 µg/ml |
| Molar absorptivity (lit/mol.cm) | 12.6x $10^3$ |
| Sandell's sensitivity (µg/$cm^2$/0.001 abs. unit) | 0.07898 |
| Correlation coefficient ($r^2$) | 0.9966 |
| Intercept | 0.0067 |
| Slope | 0.0167 |

Relative standard deviation of 0.0621 % and 0.1224 was observed for analysis of five replicate samples of two brands CAR-I and CAR-II, respectively. Carvedilol exhibited maximum absorption at 285 nm and obeyed Beer's law in the range of 4-36 µg/ml. The percentage recovery value between 99.18% and 99.33% (**Table 2**) indicates that there is no interaction of the excipients present in the formulations. The study was made to test ruggedness of the method through an interday and intraday analysis of samples.

**TABLE 2: DETERMINATION OF CARVEDILOL IN PHARMACEUTICAL PREPARATIONS**

| Tablet Code | Label Claim (mg/tab) | Amount found (mg) | % Recovery ± SD |
|---|---|---|---|
| CAR-I | 25 | 24.79 | 99.18± 0.15 |
| CAR-II | 25 | 24.83 | 99.33± 0.22 |

**CONCLUSIONS:** Based on the results obtained, it is found that the proposed method of analysis is accurate, precise, reproducible & economical and can be employed for routine quality control of carvedilol in tablet formulations.

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