Spectrophotometric Determination of Carvedilol from Bulk and Formulations

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A new, simple, sensitive spectrophotometric method in ultraviolet region has been developed for the determination of carvedilol in bulk and in pharmaceutical formulations. Carvedilol exhibited maximum absorbance at 285 nm with apparent molar absorptivity of 15.4x10³ l/mol.cm in methanol. Beer's law was found to be obeyed in the concentration range of 4-36 μg/ml. Results of the analysis were validated statistically and by recovery studies.

Carvedilol is chemically 1-(9H-carbazol-4-yloxy)-3-[(2-(2-methoxyphenoxy) ethyl) amino], which is a nonselective β-adrenergic blocker with α_1-blocking activity[1]. It is used in the treatment of severe heart failure, bradycardia and hypotension[2]. It is listed in the Merck Index complete drug reference[3]. A survey of literature revealed a HPLC method for stereoselective analysis of carvedilol in serum[4]. Simultaneous HPLC determination of enantiomers of carvedilol and its o-desmethyl metabolite in human plasma has been reported[5]. A colorimetric method of estimation for carvedilol has also been reported[6]. In the present investigation an attempt was made to develop a simple and economical spectrophotometric method with greater precision, accuracy and sensitivity for the analysis of carvedilol in bulk and dosage forms.

A Shimadzu mode U-1601 UV/Vis spectrophotometer with 1 cm matched quartz cells was used. Carvedilol (Cipla India Limited, Daman) and methanol, AR Grade (Merck India Limited, Mumbai) were used in the study. Tablets were procured from a local pharmacy. Carvedilol (50 mg) was accurately weighed and dissolved in 50 ml of methanol to give a stock solution (1000 μg/ml.) Aliquots of 100 μg/ml solution were suitably diluted with methanol to give final concentration of 4, 8, 12, 16, 20, 24, 28, 32 and 36 μg/ml. Absorbance was measured at 285 nm against methanol as a blank.

For analysis of carvedilol in tablets, two commercial brands of 25 mg were taken. Twenty tablets of each were weighed and powdered. The tablet powder equivalent to 25 mg of carvedilol was weighed accurately, dissolved in methanol and the volume of solution was made up to 100 ml with methanol. The solution was filtered through Whatman filter paper No. 40. An aliquot corresponding to 25 μg/ml was analyzed by the method described above.

The method was validated according to ICH guidelines[7]. The proposed method for determination of carvedilol showed molar absorptivity of 15.39 x 10³ l/mol.cm. Linear regression of absorbance on concentration gave the equation Y= 0.0372X+0.0242 with a correlation coefficient (r) of 0.9909 (Table 1). Relative standard deviation of 0.0755 % and 0.1422 % was observed for analysis of five replicate samples of two brands A and B, respectively. Recovery studies were carried out at three different levels, by adding 2.5, 5.0 and 7.5 mg/ml of pure drug solution to different samples of tab-

TABLE 1: OPTICAL CHARACTERISTICS, PRECISION AND ACCURACY DATA

Parameter	Value
λ_{max} (nm)	285
Beer's law limit (μg /ml)	4 – 36
Molar absorptivity (L/mol.cm)	15.39x10³
Correlation coefficient (r)	0.9909
Regression equation	Y=ax+b
Intercept (a)	0.0242
Slope (b)	0.0372

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TABLE 2: ANALYSIS OF CARVEDILOL TABLETS

Tablet Formulation	Label Claim (mg/tab)	Amount found (mg/tab)	% label claim ±SD	SEM	% Recovery ±SD
Brand A					
Carloc 25 (Cipla)	25	24.72	99.03±0.14	0.063	99.2±0.15
Brand B					
Cardivas 25 (Sun)	25	24.78	99.21±0.07	0.033	99.4±0.12

*Average of five determination

let powder solution containing the equivalent of 25 mg/ml of drug. From the amount of drug found, percentage recovery was calculated.

Carvedilol exhibited maximum absorption at 285 nm and obeyed Beer's law in the concentration range of 4-36 μg/ml. The percentage recovery value between 99.2% and 99.4% (Table 2) indicates that there is no interference 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. Results obtained confirmed ruggedness of the method. The developed method was found to be accurate, precise, repeatable, reproducible and stability indicated and can be used for the routine analysis of carvedilol in bulk drug and formulations.

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In Vitro Cytotoxic Studies of Mannich Bases of β-Diketones

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***In vitro* cytotoxic activity of some 2-(N-aryl/heteroaryl aminomethyl)-1,3-diphenyl/1-phenyl-3-(3-nitrophenyl)/1-phenyl-3-(pyridin-3-yl)propan-1,3-diones were determined by adopting three methods (Trypan blue dye exclusion, Lowry, MTT, 3-(4,5-dimethyl thiazol-2-y1)-2,5-diphenyl tetrazo-**

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