
Spectrophotometric methods for estimation of benidipine Hydrochloride from Tablets

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Three simple, sensitive and accurate extractive colorimetric methods for estimation on benidipine hydrochloride from tablet formulation have been developed. The developed methods involve formation of coloured chloroform extractable ion pair complexes of the drug with bromocresol green (BCG), bromophenol blue (BPB) and thymol blue (TB) in acidic medium. Extracted complexes showed absorbance maxima at 408.5 nm (BCG), 404 nm (BPB) and 570 nm (TB) and Beer's law is obeyed in concentration range of 0 - 60 µg/ml, 0 - 40 µg/ml and 0 - 30 µg/ml respectively. Results of analysis were validated statistically and were found to be reproducible.

BENIDIPINE hydrochloride is a relatively new calcium channel blocker used as antihypertensive and anti-anginal agent. In literature, reported methods of analyses include HPLC¹, GC² and radioimmunoassay³ for estimation of benidipine hydrochloride from body fluids. None of the method is reported for estimation of the drug from pharmaceutical formulations, hence an attempt has been made to develop three simple spectrophotometric methods of analysis of benidipine hydrochloride from tablets.

Jasco UV/visible recording spectrophotometer (model 7800) with 1 cm matched quartz cells was used. All reagents used were of analytical grade. Acid phthalate buffer pH 2.4 and 3.0 was prepared as per [P⁴] by mixing appropriate quantities of 0.2 M potassium hydrogen phthalate and 0.2 M hydrochloric acid. 0.1 % dye solutions were prepared in phthalate buffer of pH 3.0 (Solution A, BPB) and pH 2.4 [solution B (BCG) or solution C (TB)]. Each solution was extracted several times so as to remove chloroform soluble impurities.

Twenty tablets were accurately weighed and average weight per tablet determined. The tablets, were powdered and powder equivalent to 4 mg benidipine hydrochloride was accurately weighed and transferred to a 100 ml

volumetric flask. About 75 ml of chloroform, was added and shaken for 5 minutes to dissolve benidipine hydrochloride. The solution was filtered through a Whatman filter paper no. 41 into another 100 ml volumetric flask. Filter paper was washed with chloroform and washings were added to filtrate. The volume was made upto the mark with chloroform. Five ml of this solution was diluted to 10 ml with chloroform.

To 10 ml of final dilution in a separating funnel 5 ml of solution A (B or C) was added shaken gently for 5 min. The chloroform layer was separated and absorbance measured at respective wavelength maximum using a reagent blank. The amount of drug present in the sample was computed from calibration curve prepared using standard sample solution using the method described above. Recovery studies were carried out by addition of known quantities of standard drug solution to preanalysed sample solution. Results of analysis and recovery studies are reported in table - 1.

The proposed spectrophotometric methods for determination of benidipine hydrochloride from tablet formulations were found to be simple, accurate, rapid and sensitive. These developed methods can be used for routine analysis of this drug. The values of standard deviation were statistically low and recovery was close to 100% indicating reproducibility of the methods. All methods are based

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Table - I : Results of Assay and Recovery Experiments

Reagent Used	Labelled amount (Mg/tab)	% of label claim estimated*	C.V.	% Recovery**
BCG	4	98.34 (0.262)	1.336	98.68
	8	99.08 (0.131)	0.664	
BPB	4	99.71 (0.183)	0.918	99.27
	8	99.04 (0.062)	0.317	
TB	4	99.53 (0.192)	0.966	98.75
	8	98.92 (0.109)	0.555	

* Average (\pm standard deviation) of three determinations.

** Recovery of amount added to the pharmaceutical formulation (average of four determinations)

on formation of chloroform extractable ion pair complexes of benidipine hydrochloride with dyes. Methods are economical and rapid. Since none of the methods is reported for estimation of drug from pharmaceutical formulation, these methods can be of great value for routine analysis.

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Antiinflammatory Activity of the Essential Oil of *Cymbopogon Martinii*

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Oil of *Cymbopogon martinii* leaves obtained by distillation was given orally to study its effects on the exudative phase of the inflammatory reactions, using the technique of carrageenan-induced paw oedema. Oil of *Cymbopogon martinii* showed dose-dependent anti-inflammatory activity comparable to that of diclofenac sodium.

CYMBOPOGON *martinii* (fam:Graminae) is commonly known as palmarosa. The leaves of *Cymbopogon martinii* contains about 1.4% oil (dry basis), the oil content is more or less constant throughout

the season². The oil is usually soluble in 3 Volumes of 70 % alcohol, it consists of d- ∞ -phellandrene, d-limonene, perillic alcohol an aldehyde of the formula C₁₀H₁₆O and traces of carvone³. *C. martinii* have been reported to have diuretic, diaphoretic and emmenagogue⁴ properties.

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