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Spectrophotometric Methods for the Determination of Selected Drugs in Pharmaceutical Formulations

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Abstract

Simple, sensitive and precise spectrophotometric methods have been developed for the estimation of valacyclovir, aceclofenac, racecadotril, valdecoxib, nebivolol and reboxetine in bulk and pharmaceutical dosage forms. Methanol and triple distilled water were used as solvents for the estimation of all these drugs. Absorption maxima of all the above drugs were determined and the estimations were carried out in tablet dosage forms. Results of the analysis were validated statistically and by recovery studies.

Keywords: Estimation, Drug, Assay and Recovery.

Introduction

Valacyclovir [1], Aceclofenac [2], Racecadotril [3], Nebivolol [4], Reboxetine [5] and Valdecoxib [6], are recently introduced into the market. Literature survey reveals that the drugs are not official in any pharmacopoeias. Few analytical methods have been developed which include HPLC [7-12] and LC-MS [13-18]. In this paper we developed simple UV methods for all these drugs using methanol and triple distilled water. Aceclofenac (ACF) and Valdecoxib (VXB) are used as non-steroidal anti-inflammatory agents. Valacyclovir (VCV) is used as an antiviral drug. Nebivolol (NBV) is a β_1-blocker used as an anti-hypertensive drug. Racecadotril (RDT) is used as anti-diarrhoeal and Reboxetine (RBT) as an antidepressant.

Experimental

Instrumentation: Spectral and absorbance measurements were made with ELICO SL 164 Double beam UV-Visible spectrophotometer with 1 cm path length quartz cells.

Standard and sample solutions: For all the drugs, methanol (HPLC grade) was used to prepare the stock solutions of 1mg/ml. The final dilutions were made with triple distilled water. All the drugs were scanned initially for their absorption maxima and calibration curves were plotted. The results are furnished in Table-1.

Table 1: Optical characteristics of the proposed methods

Drug	Parameter						
	λ_{max} (nm)	Beer's law limit (µg/ml)	Molar absorptivity (l/mole.cm)	Correlation coefficient (r)	Slope (m)	Intercept (c)	%RSD
ACF	273	2.5-20	$1.7709x10^4$	0.9995	0.047	0.0035	1.234
VDB	241	0.5-8	$3.175x10^4$	0.9998	0.103	-0.0039	0.879
VCV	278	10-50	$3.697x10^3$	0.9999	0.011	0.0008	1.202
NBV	281	10-60	$5.37208x10^3$	0.9998	0.014	0.00068	1.365
RDT	230	5-60	$4.741x10^3$	0.9996	0.011	0.0098	0.987
RBT	271	10-60	$1.614x10^3$	0.9999	0.005	-0.0016	0.684

Results and Discussion

The optical characteristics such as absorption maxima, Beer's law limits and molar absorptivity are presented in Table-1. The regression analysis using the method of least square was made for the slope (m), intercept (c) and correlation coefficient (r) obtained from different concentrations and the results are summarized in Table-1. The recovery studies were performed by adding known amount of drug solution to the preanalysed solutions. The results are furnished in Table-2. The high percentages of recovery indicate that there are no interferences from the adjuvants used in the formulation. The proposed methods were found to be simple, sensitive, accurate and could be used for the routine quality control analysis of these drugs.

Table 2: Assay and recovery studies

Drug	Label claim (mg/Tablet)	% amount found*	% Recovery
ACF	100	101.08± 0.02	99.78± 0.06
VDB	20	98.98± 0.07	100.01± 0.02
PXB	40	99.67± 0.01	101.23± 0.05
VCV	500	99.54± 0.01	99.34± 0.08
NBV	5	98.75± 0.05	99.45±0.01
RDT	100	101.04± 0.08	98.01±0.05
RBT	2	98.21± 0.02	98.05±0.03

* Mean of five determinations.

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