Simple UV Spectrophotometric Determination of Celecoxib in Pure Form and in Pharmaceutical Formulations

R. Revathi,* R. Venkatesha Perumal, S. Sudharshini, A. Mohammed Ansar, A. Thilagalakshmi, and A. P. Dinesh

Department of Pharmaceutical Chemistry, Bharathi College of Pharmacy, Bharathi Nagar – 571422, Mandya, Karnataka.

ABSTRACT:

Background: A new, simple and sensitive spectrophotometric method in Ultraviolet region has been developed for the determination of Celecoxib in bulk and in pharmaceutical formulations.

Method: Celecoxib, exhibits absorption maxima at 255 nm with apparent molar absorptivity 1.7848 X 10^4 L/mol.cm in chloroform. Beer’s law was found to be obeyed in the concentration range of 2-10µg/mL. The method is accurate, precise and economical. This method is extended to pharmaceutical preparations.

Results: In this method, there is no interference from any pharmaceutical additives and diluents. Results of the analysis were validated statistically and by recovery studies.

Introduction

Celecoxib is chemically 4-[5-(4-methylphenyl)-3-(trifluoromethyl) pyrazol-1-yl] benzenesulfonamide and is a diaryl substituted pyrazole. It is a non-steroidal anti-inflammatory drug (NSAID), which is a specific cyclooxygenase 2 (cox-2) inhibitor [1,2]. At position 523 there is an isoleucine molecule in cox-1 and a valine in cox-2. The smaller valine molecule in cox-2 leaves a gap in the wall of the channel given access to a side pocket which is to be in the site of binding of the selective cox-2 inhibitor Celecoxib [3]. A survey of literature showed HPLC methods for the estimation of Celecoxib in pharmaceutical preparations [4-7] and in biological fluids [8-10]. It was also estimated by HPTLC [11], spectrofluorometric [12] and densitometric [13] methods. By keeping this in mind it was envisaged to develop a simple UV spectrophotometric method which is reliable, specific, rapid, sensitive, accurate and economical.

Experimental

Apparatus

An ELICO double beam UV-Visible spectrophotometer equipped with 10mm matched quartz cells was used in the present investigation A SCALTEC electronic balance was used.

Key words: Celecoxib, Spectrophotometric determination, validation

Received 21 November 2011; received in revised form 30 December 2011; accepted 31 December 2012

*Corresponding Author: R. Revathi, Department of Pharmaceutical Chemistry, Bharathi College of Pharmacy, Bharathi Nagar – 571422, Mandya Dist. Karnataka

Email: rrvmsu@gmail.com

Copyright ©2011 Published by IJPSL. All rights reserved
Absorbances were read and concentrations of Celecoxib determined using the calibration curve. Calculations were then made with dilution factor to find out the concentration of the drug in capsules. The experiments were repeated to six times to check its reproducibility.

RESULTS AND DISCUSSION

The proposed method for determination of Celecoxib showed molar absorptivity of \( 1.7848 \times 10^4 \) L/mol.cm. Linear regression of absorbance on concentration gave the equation: \( y = 0.046814x + 0.00024 \) with a correlation co-efficient \( r \) of 0.999 (Table-1). Statistical analysis of commercial formulations has been shown in Table-2

Table 1. Optical characteristics of Celecoxib

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \lambda_{\text{max}} ) nm</td>
<td>255</td>
</tr>
<tr>
<td>Beer’s law limit 100 µg/mL</td>
<td>2-10</td>
</tr>
<tr>
<td>Molar absorptivity, L/mol.cm</td>
<td>( 1.7848 \times 10^4 )</td>
</tr>
<tr>
<td>Sandell’s sensitivity</td>
<td>0.02 14</td>
</tr>
<tr>
<td>( \mu g/cm^2 \times 0.001 ) absorbance unit</td>
<td>0.999</td>
</tr>
<tr>
<td>Regression equation</td>
<td>( Y = ax + b )</td>
</tr>
<tr>
<td>Slope (a)</td>
<td>0.046814</td>
</tr>
<tr>
<td>Intercept (b)</td>
<td>0.00024</td>
</tr>
<tr>
<td>Correlation coefficient (( r ))</td>
<td>0.999</td>
</tr>
</tbody>
</table>

Table 2. Statistical Analysis of Celecoxib capsules

<table>
<thead>
<tr>
<th>Brand</th>
<th>Label claim mg/capsule</th>
<th>Amount found mg/capsule</th>
<th>% label claim ± SD*</th>
<th>SE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zycle/100</td>
<td>100</td>
<td>100.13</td>
<td>100.13% ± 0.2651</td>
<td>0.5929</td>
</tr>
</tbody>
</table>

*Average of Six determinations

To evaluate the validity and reproducibility of the method known amount of pure drug was added to the analyzed sample of capsule powder and the mixture was analyzed for the drug content using the proposed method. The percentage recovery was found to be within range (Table-3) Celecoxib exhibited maximum absorption at 255nm and obeyed Beer’s law in the concentration range of 2-10µg /mL. The recovery experiments indicated the absence of interference from the commonly encountered pharmaceutical additives and excipients

*Average of six determinations

Thus it can be said that the proposed method is precise, accurate economical which can be very well applied to the marketed samples.

Table 3. Recovery Studies of Celecoxib capsules

<table>
<thead>
<tr>
<th>Brand</th>
<th>Amount Added mg</th>
<th>Amount found mg</th>
<th>% Recovery ± S.D*</th>
<th>SE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zycle/100</td>
<td>5</td>
<td>4.9703</td>
<td>99.4 ± 0.01877</td>
<td>0.0076</td>
</tr>
</tbody>
</table>

Acknowledgements

The authors thank the Natco Pharma, Hyderabad for providing the gift sample of Celecoxib.

REFERENCES


Cite this article as: Revathi,* R. Venkatesha Perumal, S. Sudharshini, A. Mohammed Ansar, A. Thilagakshi, and A. P. Dinesh. Simple UV Spectrophotometric Determination of Celecoxib in Pure Form and in Pharmaceutical Formulations. Int. J. Pharm. Sci. Lett. 2011; 1; (2) 49–50

Source of Support: Nil. Conflict of interest: None declared.