SIMULTANEOUS SPECTROPHOTOMETRIC ESTIMATION OF ITOPRIDE AND RABEPRAZOLE IN COMBINED DOSAGE FORM


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ABSTRACT

Two simple, rapid and accurate methods have been developed for the estimation of itopride and rabeprazole in the mixture. Itopride has absorbance maxima at 257.5 nm and rabeprazole has absorbance maxima at 292 nm in 0.01N NaOH. The linearity range was observed in 5-25µg/mL for itopride and rabeprazole. First method is based on simultaneous equation and second method is based on Q absorbance ratio. Absorbances at isoabsorbtive point 271.9 nm and at λ_{max} of rabeprazole were measured for Q absorbance ratio method. These methods were validated statistically. The recovery study confirmed the accuracy of proposed methods.

Key words: Itopride, Rabeprazole, UV-Spectrophotometer, Simultaneous estimation.

INTRODUCTION

Itopride\(^1\), N - [(4 - (2 dimethylaminomethoxy) phenyl)methyl] - 3, 4 - dimethoxybenzamide is an inhibitor of D\(_2\) receptor at parasympathetic nerve ends and thereby increases the release of acetylcholine and decreases the metabolism of acetylcholine by inhibiting enzyme acetylcholinesterase by maintaining higher ACh levels. Itopride increases the esophageal sphincter pressure, which accelerates gastric emptying and improves the gastro-duodenal coordination. Because of its dopamine D\(_2\) receptor antagonistic action, it also exerts antiemetic action.

Rabeprazole\(^2\)\(^-\)\(^5\), 2-[(4-(3-methoxy propoxy)3-methyl-2-pyridinyl)methyl sulfinyl]-1H benzimidazole is a proton pump inhibitor that suppresses gastric acid secretion by the specific inhibition of the H\(^+\)/K\(^+\) ATPase system. No method is reported for simultaneous

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estimation of these drugs in combination by spectrophotometry and hence, the present work was undertaken.

![Itopride](image1)

**Itopride**

![Rabeprazole](image2)

**Rabeprazole**

**EXPERIMENTAL**

In this study, two simple, rapid, accurate and economical methods have been developed for simultaneous estimation of itopride and rabeprazole in combination. Itopride (100 mg) and rabeprazole (100 mg) were accurately weighed and dissolved in 0.01N NaOH to give stock solution having concentration of 1000 µg/mL. From the stock solution working standard solution with 10 µg/mL concentration were prepared by appropriate dilution. Working standard solutions were scanned in the entire UV range to determine the $\lambda_{\text{max}}$ using 0.01N NaOH as blank. The $\lambda_{\text{max}}$ of the itopride and rabeprazole was found to be 257.5 and 292 nm, respectively. Five standard dilutions of each drug were prepared having concentrations of 5, 10, 15, 20 and 25 µg/mL for itopride and rabeprazole separately from the working standard. The absorbances of these standards were measured at 257.5 nm and 292 nm and the calibration curves were plotted at these wavelengths. The absorptivity coefficients of two drugs were determined. The overlain spectra of itopride and rabeprazole are represented in Fig.1.
Simultaneous equation method

The absorbance and absorptivity values at particular wavelength were substituted in following equation to obtain concentration-

(i) \[ C_x = A_2^2 a_x^1 - A_1^1 a_y^2 / a_x^1 . a_y^1 - a_x^1 a_y^2. \]

(ii) \[ C_y = a_x^2 A_1^1 - a_x^1 A_2^2 / a_x^2 . a_y^1 - a_x^1 a_y^2 . \]

Where \( A_1^1, A_2^2 \) are absorbance of the mixture, \( a_x^1, a_x^2 \) are absorptivities of \( x \), \( a_y^1, a_y^2 \) denote the absorptivities of \( y \) at 257.5 nm and 292 nm, respectively; Where \( C_x \) is the concentration of itopride and \( C_y \) is the concentration of rabeprazole. Thus, concentration of \( C_x \) and \( C_y \) can be obtained as-

\[ C_x = A_2^2 111.3 - A_1^1 383.3/-105683.17. \]
\[ C_y = A_1^1 130.8 - A_2^2 313.8/-105683.17. \]

Fig. 1: Overlain spectra of itopride and rabeprazole

Q Absorbance ratio method

Absorbance ratio method uses ratio of absorbances at two selected wavelengths; one at isoabsorptive point and other being at the \( \lambda_{max} \) of one of the components. From the
overlaid spectra of two drugs, it was evident that itopride and rabeprazole have isoabsorptive point at 271.9 nm and $\lambda_{max}$ of rabeprazole is at 292 nm. Three standard solutions of each drug having concentration 10 $\mu$g/mL each were prepared separately in 0.01N NaOH and absorbances at 271.9 nm (isoabsorptive point) and 292 nm ($\lambda_{max}$ of rabeprazole) were measured and absorptivity coefficients were calculated.

Concentration of two drugs in the mixture can be calculated using equation-

$$C_I = \frac{Q_M - Q_Y}{Q_M - Q_Y} \times \frac{A_1}{aI_1}$$

$$C_R = \frac{Q_M - Q_X}{Q_Y - Q_X} \times \frac{A_2}{aR_1}$$

Where the $A_1$ and $A_2$ are the absorbances of the mixture at 271.9 nm and 292 nm; $aI_1$ and $aR_1$ are absorptivities of itopride and rabeprazole, respectively at 271.9 nm; $aI_2$ and $aR_2$ are absorptivities of itopride and rabeprazole, respectively at 292 nm and $Q_M = A_2/A_1$, $Q_Y = aR_2/aR_1$ and $Q_X = aI_2/aI_1$.

### Table 1. Analysis of tablet formulation

<table>
<thead>
<tr>
<th>Method</th>
<th>Formulation</th>
<th>Label claim (mg/tab)</th>
<th>Amount found (mg/tab)</th>
<th>% of label claim</th>
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<tbody>
<tr>
<td>I</td>
<td>ITO RAB</td>
<td>ITO RAB</td>
<td>ITO RAB</td>
<td>ITO RAB</td>
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<td>ITO RAB</td>
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<td>150 20</td>
<td>143.31 19.92</td>
<td>95.54 99.60</td>
</tr>
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</table>

ITO: Itopride; RAB: Rabeprazole; Tab I: Rabiros IT ; Tab II: Itorab

A mixture of the combination of both the drugs was prepared containing 25 mg itopride and 10 mg rabeprazole. Above mixture was taken in the 100 mL volumetric flask containing 0.1 N NaOH. The flask was subjected to sonication so as to dissolve the mixture and volume was made up by 0.1 N NaOH (Stock solution). From the stock solution, 1 mL of sample was taken in 10 mL volumetric flask and the volume was made up by 0.1 N NaOH. The absorbances at selected wavelengths were recorded. The
concentrations of itopride and rabeprazole were worked out utilizing the equations developed. The diluted solutions were also used for the recovery studies.

**Assay of marketed formulation**

Twenty tablets were accurately weighed. An accurately weighed quantity of powder equivalent to 25 mg itopride and 3.3 mg rabeprazole was taken into 100 mL volumetric flask. In order to minimize the dose difference, appropriate quantity of rabeprazole was added to the mixture so as to make the amount 10 mg. 0.1 N NaOH was added to the flask and flask was subjected to sonication. Volume was made up with 0.1 N NaOH (Stock solution). From this stock solution, 1 mL of sample was withdrawn and taken into 10 mL volumetric flask. Volume was adjusted to 100 mL with 0.1 N NaOH and absorbance was measured at 257.5 nm, 292 nm and 271.9 nm (isoabsorptive point). The diluted solutions were also used for the recovery studies.

**RESULTS AND DISCUSSION**

The validation parameters were studied at all the three wavelengths for both the methods. Accuracy was determined by calculating the recovery and the mean was determined (Table 2). By observing the validation parameters, both the methods were found to be specific, accurate and precise. Hence, both the methods can be employed for routine analysis of these two drugs in combinations.

**Table 2. Recovery study data**

<table>
<thead>
<tr>
<th>Method</th>
<th>Conc. of drug in tablet (µg/mL)</th>
<th>Conc. added to the tablets sample (µg/mL)</th>
<th>Amount recovered</th>
<th>% Recovery</th>
</tr>
</thead>
<tbody>
<tr>
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<td>8</td>
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<td>2</td>
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<tr>
<td>II</td>
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<tr>
<td></td>
<td>20</td>
<td>8</td>
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</table>

ITO: Itopride  RAB: Rabeprazole
Table 3. Statistical evaluation

<table>
<thead>
<tr>
<th>Method</th>
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<th>Coefficient of variation</th>
<th>Standard error</th>
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(i) The results are mean of five readings (n = 5)
(ii) Tab I: Rabiros IT Tab II: Itorab

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REFERENCES


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