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Estimation of Esomeprazole by RP-HPLC in Pure and Pharmaceutical Dosage Form

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A simple, precise RP-HPLC method was developed for the estimation of esomeprazole pure and pharmaceutical dosage forms. The quantification was carried out using C-18 column 250 × 4.6 mm i.d, 5 µm particle size in isocratic mode, with mobile phase comprising of buffer and acetonitrile in the ratio of 65:35 (v/v) pH 3.2. The flow rate was 1 mL/min and the detection was carried out by using UV detector at 295 nm. The retention time was found to be 6.30 min for esomeprazole. The method produced linear response in the concentration range of 200-1000 µg/mL for esomeprazole.The percentage recovery was found to be 99.98 %.The method was validated by evaluation of required parameters.

Key Words: RP-HPLC, Esomeprazole.

INTRODUCTION

Esomeprazole[1] belongs to gastrointestinal drugs category to suppress the gastric acidity and treatment of peptic ulcer by inhibiting the proton pump. Chemically it is known as 5-methoxy-2-[(4-methoxy-3,5-dimethyl -2-pyridinyl)methyl]sulfinyl]-1H-benzimidazole. Esomeprazole is cost effective in the treatment of gastric oesophageal reflux diseases. Esomeprazole is (S-isomer of omeprazole), the first single optical isomer proton pump inhibitor which generally provides better acid control than racemic proton pump inhibitors. Its molecular weight is 713.13.

The literature survey[2-7] indicates that omeprazole has been determined individually by UV, HPTLC, HPLC in pure and pharmaceutical dosage forms and esomeprazole has been determined only in plasma. No method has been reported for the estimation of esomeprazole. So an attempt was made to develop, a simple, precise, accurate and economical HPLC method for the estimation of esomeprazole in pure and pharmaceutical dosage forms.

EXPERIMENTAL

Pure standard esomeprazole was obtained as gift sample from MARAL Laboratories Ltd., Chennai. The purity of the standard was found to be 99.98 %. Acetonitrile, methanol, sodium dihydrogen *ortho*-phosphate and water used were of HPLC grade (qualigens). Marketed sample was used in the study. An isocratic HPLC (Shimadzu, Tokyo) with a single pump Lc-10 ATVp equipped with universal injector (Rheodyne) with injection volume 20 µL, Ultra violet visible detector (UV-Vis) SPD-10 AVp-Shimadzu series and Shimadzu Class Vp software. A Thermo Hypersil key stone C-18 column 250 × 4.6 mm i.d, with 5 µm particles. Detection was carried out by UV detection at 295 nm.

Preparation of standard drug solution: Stock solution of the drug was prepared by dissolving 100 mg of esomeprazole in 100 mL volumetric flasks containing 70 mL of methanol (HPLC grade, qualigens) sonicated for about 15 min and then made upto volume with methanol. Daily working standard solutions of esomeprazole were prepared by suitable dilution of the stock solution with appropriate mobile phase.

Chromatographic conditions: The separation was performed on a Hypersil, ODS, C-18 (250 × 4.6 mm, 5 µm) column, a mixture of buffer (pH 3.2): Acetonitrile (63:35,v/v) was used as a mobile phase at a flow rate of 1 mL/min. Detection was performed at 295 nm. The mobile phase was filtered through a 0.45 µm Millipore membrane filter and degassed. The separation was carried out at ambient temperature.

Recommended procedure: After systematic and detailed study of the various parameters involved, the following procedure and conditions were recommended for the determination of esomeprazole in bulk samples and in pharmaceutical dosage forms.

Method development: Composition and flow rate of the mobile phase was programmed from motor pump and the mobile phase consisting of acetonitrile: buffer in the ratio of 65:35 was passed through the 0.45 µm membrane filter using millipore HPLC solvent filtration assembly and delivered at 1 mL/min for column stabilization. During this period, the baseline was continuously monitored. The wavelength of detection was selected at 295 nm. The prepared dilutions containing concentrations of esomeprazole in the range of 200-1000 µg/mL were injected into the chromatograph. The peak areas were recorded for all the chromatograms.

Calibration curve was constructed by plotting peak areas (Y-axis) against the amount of drug in µg/mL (X-axis) and the linear relationship was evaluated by calculation of regression line by the method of least squares.

Assay procedure: In a 100 mL calibrated flask an accurately weighed amount from the mixed and powdered contents of 20 tablets of 20 mg esomeprazole was dissolved in 70 mL of the mobile phase and the contents were thoroughly shaken for 10 min. Then the volume was diluted upto the mark with methanol, mixed well and filtered using quantitative filter paper. Working standard solution of esomeprazole was further diluted with mobile phase. 20 µL of working standard solution were injected into the column. The peak areas of esomeprazole were calculated. The amount of drug was assayed from the calibration graph, which was constructed using a standard solution of esomeprazole.

RESULTS AND DISCUSSION

The present study carried out to develop a simple, rapid, accurate and precise RP-HPLC method for the analysis of esomeprazole in pharmaceutical dosage forms using most commonly employed RP C-18 column with UV detection. The retention time for esomeprazole was 6.30 min. The total run time of the proposed method was less than 10 min. A good linear relationship (r = 0.9998) was observed The intra-day and inter-day variations of the method were determined using five replicate injections of three different concentrations which were prepared and analyzed on the same day and three different days over a period of 2 weeks, a low coefficient of variation was observed and the results are given in Table-1

TABLE-1
PRECISION OF METHOD

Drug	Concentration (µg/mL)	Observed concentration (n = 5)*			
		Intra day	CV (%)	Inter day	CV (%)
Esomeprazole	100	100.098	0.14	100.120	0.16
	200	200.142	0.18	200.124	0.15
	300	300.154	0.21	300.142	0.19

*Mean of 5 values

To ensure the reliability and accuracy of the proposed method, recovery studies were carried out by mixing a known quantity of drug with pre-analyzed sample and the contents were reanalyzed by the proposed method. The values are given in Table-2. About 99.98 % of esomeprazole could be recovered from the preanalyzed samples indicating the high accuracy of the proposed HPLC method. The drug content in the tablet was quantified using the proposed analytical method. The mean amount of esomeprazole were calculated and the system suitability parameters are given in Table-3.

TABLE-2
RECOVERY STUDIES

Drug	Amount added	Amount recovered	Mean amount found (n=5)*	Mean recovery (%)
Esomeprazole	20	19.98	19.87	99.78
	40	39.54	39.62	99.86
	60	59.46	59.68	98.86

*Mean of 5 values

TABLE-3
SYSTEM SUITABILITY PARAMETERS

Parameter	Esomeprazole
Resolution factor	2.12
Theoretical plates	2520
Linearity range (µg/mL)	200-1000
Relative standard deviation RSD (%)	0.0460
Limit of quantification LOQ (µg/mL)	0.2160
Relative standard deviation RSD (%)	0.0637
Tailing factor	1.6500

It can be concluded that the proposed HPLC method is simple, sensitive, rapid and reproducible for the analysis of esomeprazole in pharmaceutical dosage forms.

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