

Development and Validation of RP-HPLC method for Simultaneous Estimation of Esomeprazole and Domperidone in Capsule Formulation

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Abstract: Background: The literature has indicated that there is no “analytically significant” method ever developed by the chemists across the globe for the simultaneous determination of esomeprazole (ESO) and domperidone (DOM) in a capsule formulation. Hence, there is a need for the development of novel, simple, sensitive, rapid, accurate and reproducible analytical methods for the routine estimation of ESO and DOM in capsule dosage form. **Material and Methods:** The present novel developed analytical method utilizing the phosphate buffer (pH 8.5): acetonitrile (50:50) on a Lichrospher® 100 C₁₈ column by using a flow rate of 1 mL/min where an excellent resolution with sharp peaks of ESO and DOM present in capsule formulation. **Results:** The retention peaks were observed at 4.386 min and 7.688 min, respectively. The analytical method was validated in accordance with the ICH guidelines Q2A and Q2B where desired linearity, accuracy, precision, and robustness were observed. The system suitability parameters represented a very high reproducibility and better separation efficacy. In a modified stability study, the oxidative degradation was studied comprehensively where a mechanistic abstraction of the proton by the OH radical was predicted. **Conclusion:** The method can be conventionally used for quality control and routine analysis of drugs in pharmaceutical dosage forms in pharmaceutical industries and laboratories.

Keywords: Esomeprazole, Domperidone, Simultaneous estimation, Capsule, Formulation, Validation.

INTRODUCTION

Esomeprazole (ESO) is a proton- pump inhibitor that suppresses gastric acid secretion by inhibiting the H⁺/K⁺-ATPase pump in the gastric parietal cell. Chemically, it is 5-methoxy-2-[(S)-(4-methoxy-3,5-dimethylpyridin-2-yl)-methanesulfinyl]-1*H*-1,3-benzodiazole and finds application in the management of dyspepsia and stomach ulcer [1-3]. Domperidone (DOM), chemically 5-chloro-1-[1-[3-(2-oxo-2,3-dihydro-1*H*-1,3-benzodiazol-1-yl)propyl]piperidin-4-yl]-2,3-dihydro-1*H*-1,3-benzodiazol-2-one, is a peripherally selective dopamine D₂ receptor antagonist and is preferentially used as an anti-emetic and gastroprokinetic agent [4-5].

The combination of ESO and DOM is used in the treatment of Zollinger-Ellison syndrome, heartburn, gastroesophageal reflux disease (GERD), etc. At present, the ESO and DOM combination in the form of capsule formulation has gained a lot of significance due to the larger acceptability among the patient population and increased potency in the therapeutic regimen. These agents are extremely potent and the analysis of such potent, structurally different drugs is very important from the quality control point of view. Although, several UV-Vis [6-7], HPTLC [8-9] and HPLC [10-12] based methods have been reported for their individual analysis and in combinations with the other active pharmaceutical ingredients (APIs). So far, the literature has indicated that there is no “analytically significant” method ever developed by the chemists across the globe for the simultaneous determination of ESO and DOM in a capsule formulation. Hence, there is a need for the development of novel, simple, sensitive, rapid, accurate and reproducible analytical methods for the routine estimation of ESO and DOM in a capsule dosage form. The present work is an attempt to develop precise, accurate, simple, economic, reliable and validated HPLC method for simultaneous determination of ESO and DOM in a capsule formulation. The developed method can be

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conventionally used for quality control and routine analysis of drugs in pharmaceutical dosage forms in pharmaceutical industries and research laboratories.

METHODS AND MATERIALS

Chemicals and Reagents

ESO was received as a generous gift from the Zim Laboratory Limited, Nagpur, India and DOM was obtained from the Torrent Pharmaceutical Limited, Ahmadabad, India as a gift sample. The marketed pharmaceutical formulation was purchased from the local market. Acetonitrile, methanol, and water used were of the analytical grade. All other chemicals and reagent used were of the analytical grade unless otherwise indicated.

Instrumentation

The method was developed and validated on a Shimadzu® HPLC system LC-20AB, Rheodyne injector 7725I with a 20 µL loop, Shimadzu® SPD-20A prominence PDA detector, Shimadzu DGU-20A3 prominence degasser, Lichrospher® 100 C₁₈ column (dimension 250 × 4.6 mm, 5 µm) and controller. The LC-Solution® software was used for data acquisition.

Preparation of Mobile Phase

The mobile phase was prepared by mixing 500 mL of phosphate buffer (pH 8.5) with 500 mL acetonitrile. The mobile phase was then sonicated for the duration of 15 min and subsequently filtered through 0.45 µm membrane filter. Further, the pH of the buffer was adjusted to 8.5 by using orthophosphoric acid.

Preparation of Standard Stock Solution

An accurately weighed quantity of DOM (30 mg) and ESO (20 mg) was dissolved in acetonitrile and phosphate buffer (pH 8.5) to make a 10 mL solution, to produce a concentration of 3000 µg/mL DOM and 2000 µg/mL ESO, respectively. The solution was then subjected to sonication for the duration of 15 min at 40°C and afterward filtered through 0.45 µm membrane filter. The produced solution was further used to prepare the working solution with required aliquots.

Preparation of Standard Working Solutions of ESO and DOM

The working standard solution A was prepared by taking 1 mL of above stock solution into a 10 mL volumetric flask and diluting it up to the mark with the mobile phase to get the final working solution containing 300 ppm of DOM and 200 ppm of ESO.

The working standard solution B was prepared by taking 0.1 mL of the standard stock solution as same as above to produce the final working solution containing 30 ppm of DOM and 20 ppm of ESO. The working standard solutions were subsequently filtered through 0.45 µm membrane filter paper. The solution was subjected to sonication further for degassing purpose. This solution was then used for all the trials related to the optimization of chromatographic conditions.

Detection of Wavelength

The standard solution of both DOM and ESO were scanned at a concentration of 10 ppm in UV-spectrophotometer over the range of 400-200 nm. DOM presented λ_{max} at 284 nm whereas ESO demonstrated λ_{max} at 301 nm. A detection wavelength of 286 nm was optimized as ESO and DOM had substantially high absorbance and minimum interference of solvents at this wavelength.

Chromatographic Conditions

The chromatographic separation was carried out on a Shimadzu® HPLC instrument using the Lichrospher®100 C₁₈ (dimension 250 mm × 4.6 mm, 5.0 µm) as the stationary phase, maintained at room temperature.

The composition of the mobile phase was chosen on the basis of peak purity index, number of theoretical plates, separation efficacy, and many other parameters. A large number of trials were taken in the selection of best mobile phase. The mobile phase comprised of acetonitrile: phosphate buffer (pH 8.5) in (50:50 v/v) ratio at a flow rate of 1.0 mL/min using UV detection at 286 nm.

Validation of the Proposed Method

The proposed analytical method was comprehensively validated by the guidelines put forward by ICH. The validation was in accordance with the ICH guidelines Q2A and Q2B, by following the FDA guidance and also as per USP.

Linearity and Range

The linearity of the proposed method was determined by taking 5 concentrations in the range of 20% to 100% of the target analyte (i.e. 6-30 µg/mL for DOM and 4-20 µg/mL for ESO). All the standard solutions were prepared by initially diluting them in the mobile phase. The chromatographic conditions were set as per the optimized parameters and the mobile phase was allowed to equilibrate with stationary phase to get the steady baseline. Prepared standard solutions of different concentration were injected separately and the chromatograms were recorded. The calibration graphs for both the drugs were plotted between the average peak areas versus the concentration of drugs (µg/mL) and the linearity was expressed in regression coefficient value (r^2) [13].

Accuracy

The accuracy of the proposed method was estimated by the standard analysis method as recovery (%) of the standard test sample of the drug compared with the formerly analyzed test sample of the drug. The recovery was calculated by injecting the drug substances in presence of placebo at a target analyte concentration of 80%, 100%, and 120%. The accuracy was determined as % recovery \pm (% confidence interval) with % relative error on the base of actual and estimated concentrations. The study was performed in triplicate manner. For the determination of recovery, working standard solution was first prepared by the addition of 3 mg of DOM and 2 mg of ESO in 10 mL of mobile phase. The resulting standard solution of the drug was 300 µg/mL of ESO and 200 µg/mL of DOM, respectively. Further, the working standard stock solution was prepared by making further dilutions of above by taking 1 mL of standard solution to 10 mL in the mobile phase. The produced final working standard solution of the drug was 30 µg/mL of DOM and ESO 20 µg/mL. Accurately weighed quantities of 74.14 mg of sample equivalent to 10/15 mg of DOM and ESO were transferred to 5 different 10 mL volumetric flask. The 80%, 100%, and 120% of ESO and DOM concentration was added into the sample solution. By making the further dilutions, the resulting solution of the sample of concentrations 18/27, 20/30, and 22/33 µg/mL of ESO and DOM were produced. The percent recovery was then calculated by using formula [14]:

$$\% \text{ recovery} = \frac{A-B}{C} \times 100$$

where, A = total drug estimated (in mg), B = amount of drug contributed by the pre-analyzed sample (in mg), and C = weight of pure drug added (in mg).

Precision

The precision of the proposed analytical method was determined from the values of the relative standard deviation (RSD). The inter-day, intra-day, and different analyst variability were estimated. In the intra-day study, the analysis involved spiking three different analyte concentrations (50%, 75%, and 150%) six times in a single day. In the inter-day study, the similar operations were performed on three different days. Lastly, the different analyst based analysis involved the intra-day study by a different analyst using the same protocol [15].

Robustness

The chromatographic resolution was monitored by deliberately changing the chromatographic parameters such as detection wavelength and flow rate. Here, the flow rate was altered by + 0.2 mL/min; thereby producing 1.2 mL/min and the detection wavelength was modified by \pm 2 nm; i.e. two units changes in both the directions for both the drugs, keeping all the other parameters unchanged. The impact of the deviations over system suitability parameters was verified [16].

System Suitability Parameters

The competence of reproducibility of any system is validated by the systems suitability parameter. The analysis involved spiking the standard solution in the HPLC system five-times repeatedly and monitoring / determining the crucial parameters like theoretical plates, retention time, peak area, tailing factor, etc.

Limit of Detection and Quantification

The limit of detection (LOD) is defined as the lowest possible concentration that can be estimated by the proposed method but not necessary to measure the exact value. LOD is calculated by the formula:

$$\text{LOD} = 3.3 (\sigma / S)$$

where, σ = standard deviation of response; S = slope of the calibration curve. The slope S may be determined from the calibration curve of the analyte.

The limit of quantification (LOQ) is defined as the lowest possible concentration that can probably be measured reliably with an exacting intensity of accuracy and precision. LOQ is calculated by the formula:

$$\text{LOQ} = 10 (\sigma / S)$$

where, σ = standard deviation of response; S = slope of the calibration curve. The slope S may be determined from the calibration curve of the analyte.

Estimation of ESO and DOM in Capsule Formulation

A working solution (denoted as B) was prepared (30 $\mu\text{g}/\text{mL}$ for DOM and 20 $\mu\text{g}/\text{mL}$ for ESO, respectively) as previously described under the section preparation of the standard solution. An accurately weighed quantity of capsule equivalent to 148.32 mg was transferred to a 10 mL volumetric flask and the volume was made up to 10 mL with acetonitrile: phosphate buffer (pH 8.5). Subsequently, 1 mL of this solution was further diluted up to 10 mL with the same solvent system. Again, 2 mL was drawn from the above-produced solution and diluted further up to 10 mL with the same solvent to produce concentrations of 30 $\mu\text{g}/\text{mL}$ of DOM and 20 $\mu\text{g}/\text{mL}$ of ESO (on the labeled claim basis). The replicate sample solutions were prepared in a similar manner. After equilibration of the column with the mobile phase, replicate injection of standard and each of five sample solutions were made separately and the chromatograms were recorded. The amount of drug present in average weight of the capsule (as % labeled claim) was calculated using following formula:

$$\% \text{ of label claim} = \frac{A_U \times C_S \times DF}{A_S \times L_C \times V_S \times 1000}$$

A_U = peak area of unknown sample; A_S = peak area of standard sample; C_S = concentration of standard sample; V_S = volume of the sample (in mL); DF = dilution factor; and L_C = label claim (%).

Stability Studies

The stability studies were performed for the "intact capsule formulation" instead of pure drugs, since for both the drugs, the stability related information are already available. Only two tests were performed on the capsule formulation; oxidative degradation and photolytic degradation.

Oxidative Degradation

A capsule containing formulation was taken in a volumetric flask containing 10 mL of H_2O_2 and boiled for 1 hr. Subsequently, the capsule was placed at room temperature after the degradation process. 0.5 mg of drug equivalent to DOM and ESO was taken, dissolved in 10 mL of methanol, sonicated for 15 min, and volume was made up to 100 mL, stirred for 30 min, centrifuged for 5 min at 3000 rpm, filtered through a 0.45 μm filter, and injected into the HPLC (20 μL). The acquired chromatogram was further studied for the possible degradation.

Photolytic Degradation

The capsule was subjected to photolytic stress by keeping it in the UV chamber under UV radiations at 254 nm for three consecutive days. After three days, 0.5 mg equivalent of DOM and ESO were taken in a volumetric flask, dissolved in 10 mL of methanol, sonicated for the duration of 15 min, and volume was made up to 100 mL, stirred for the period of 30 min, centrifuged for the interval of 5 min at 3000 rpm, filtered through a 0.45 μm filter, and injected into the HPLC (20 μL).

RESULT AND DISCUSSION

Method Development and Optimization

As inspired from the previous chromatographic developments done so far for both DOM and ESO, the stationary phase of C_{18} attributes (dimension 250 \times 4.5 mm i.d., particle size 5 μm) was selected. The elution with binary eluants was tried in an isocratic mode in order to get an adequate retention for both DOM and ESO. The use of water: ACN (60:40) resulted in low intensity peaks in the chromatogram, the water: methanol (30:70) produced distorted peaks, phosphate buffer (pH 4.0): ACN (20:80) showed high tailing with a very poor resolution, phosphate buffer (pH 4.5): ACN (40:60) displayed broad peaks and lesser theoretical plates, phosphate buffer (pH 5.0): methanol (20:80) represented a hope for further development and optimization owing to improvement in the peaks with a raising theoretical plates. The mobile phase composition of phosphate buffer (pH 8.5): acetonitrile (50:50) expressed the least tailing, sharp peak with the highest theoretical plates, and therefore was judiciously chosen for the chromatogram development. While the process, an important part was kept into attention that any abrupt modification in the pH results in alteration of the retention factor within 2 units of pKa. So, the pH of the mobile phase was regulated sensibly of 2 units either higher or lower than that of the pKa to reassure unionization of the analyte. The study was performed using C_{18} column with an optimized

mobile phase of phosphate buffer (pH 8.5): acetonitrile (50:50) in isocratic mode at flow-rate of 1 mL/min at ambient temperature, using detection wavelength at 286 nm. The retention times were observed to be 4.386 min and 7.688 min (**Figure 1**), respectively. The results of the assay of ESO and DOM obtained by proposed HPLC method were pretty concurrent and reproducible. At the same time, the developed method was simple, precise, accurate, rapid, reasonably specific, and have desired ruggedness. The proposed method was found to be free of interferences from its degradation products in capsule formulation.

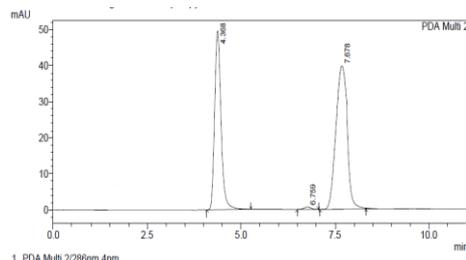


Figure 1: RP-HPLC chromatogram of domperidone and esomeprazole in capsule formulation.

Method Validation

Linearity and Range

A good linearity was detected in the study over the range 6-30 $\mu\text{g/mL}$ for DOM and 4-20 $\mu\text{g/mL}$ for ESO (**Table 1**). The linear regression equations and regression coefficient values were found to be $29517x + 10018$ ($r^2 = 0.9958$) and $32755x + 93149$ ($r^2 = 0.99$). From this study, a high acceptable degree of linearity was observed for the proposed method (**Figure 2**).

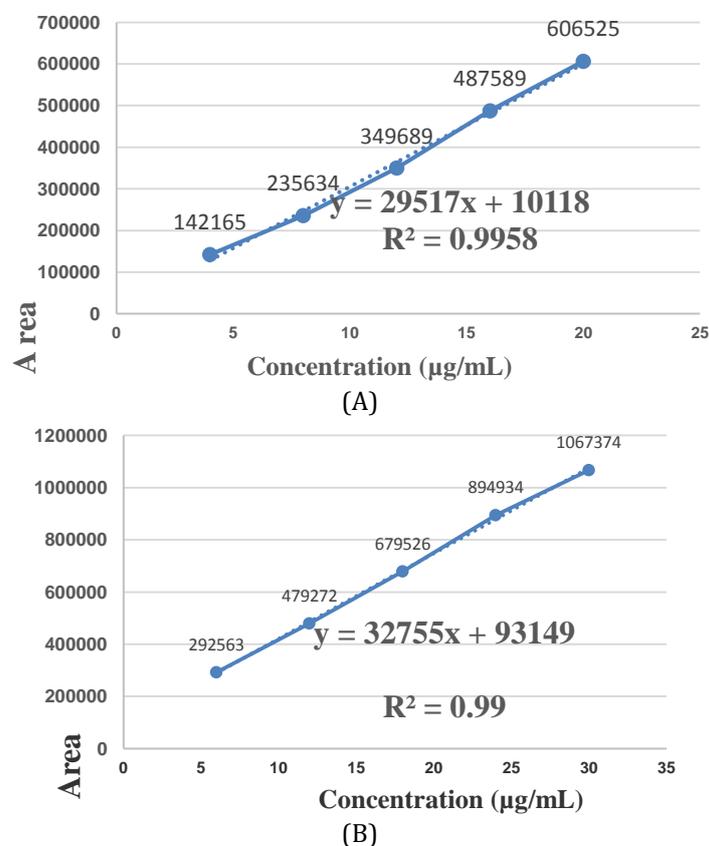


Figure 2: Linearity plots of esomeprazole (A) and domperidone (B).

Table 1: Linearity Studies of domperidone and esomeprazole.

Parameters	ESO	DOM
Concentration range	4-20 $\mu\text{g/mL}$	6-30 $\mu\text{g/mL}$
Straight line equation	$y = 29517x + 10118$	$y = 32755x + 93149$
Slope	29517	32755
Y-intercept	(+)10118	(+)93149
SD	215.056	1782.364
Correlation coefficient	0.9958	0.999

Accuracy

By using the calibration curve, the % recovery of the proposed method was estimated from the slope and Y-intercept of the graph. The determined % RSD values were 0.14, 0.18, and 0.27 at three different concentrations (80%, 100%, and 120%) for ESO whereas for 0.19%, 0.19%, and 0.14% for DOM. The above values stated that the proposed method has good accuracy owing to the acceptable limit within $\pm 2\%$. The recovery results of this analysis are described in **Table 2**.

Table 2: Recovery for accuracy studies of domperidone and esomeprazole.

Levels	Weight of sample + Amount of API added (in mg)		Total Weight of Drug Present (in mg)		Total Drug Found (in mg)		% Recovery		% RSD	
	ESO	DOM	ESO	DOM	ESO	DOM	ESO	DOM	ESO	DOM
80%	10 + 8	15 + 12	18	27	17.90	26.83	99.44	99.37	0.14	0.19
	10 + 8	15 + 12	18	27	17.95	26.87	99.72	99.51		
	10 + 8	15 + 12	18	27	17.93	26.93	99.61	99.74		
100%	10 + 10	15 + 15	20	30	19.84	29.91	99.2	99.7	0.18	0.19
	10 + 10	15 + 15	20	30	19.89	29.86	99.45	99.53		
	10 + 10	15 + 15	20	30	19.91	29.97	99.55	99.9		
120%	10 + 12	15 + 18	22	33	21.86	32.89	99.36	99.66	0.27	0.14
	10 + 12	15 + 18	22	33	21.98	32.94	99.9	99.81		
	10 + 12	15 + 18	22	33	21.92	32.85	99.63	99.54		

Precision

The % RSD values of the intra-day, inter-day, and different analyst were observed to be $< 2\%$ in each case ($n = 3$) for both the drugs at all the three levels (50%, 75%, and 150%), which suggested that the developed method has desired precision to estimate both the drugs in a capsule formulation. The results of the precision analysis are depicted in **Table 3**.

Table 3: Precision data of inter-day, intra-day, and different analyst variability of domperidone and esomeprazole.

Levels	% of labeled claim													
	Total Weight of Drug Present (in mg)		ESO						DOM					
	ESO	DOM	Intra-day	% RSD	Inter-day	% RSD	Different Analyst	% RSD	Intra-day	% RSD	Inter-day	% RSD	Different Analyst	% RSD
50%	10	15	99.42	0.25	99.98	0.08	98.81	0.07	99.24	0.29	99.61	0.16	99.72	0.12
	10	15	99.76		99.83		99.67		99.62		99.87		99.95	
	10	15	99.91		99.86		99.75		99.8		99.89		99.79	
75%	15	22	99.23	0.05	99.63	0.37	99.92	0.40	99.65	0.11	99.68	0.02	99.84	0.08
	15	22	99.17		98.86		98.74		99.46		99.65		99.99	
	15	22	99.27		99.13		99.15		99.45		99.64		99.85	
150%	25	37.5	99.49	0.21	99.75	0.05	99.63	0.08	99.68	0.35	99.82	0.14	99.57	0.08
	25	37.5	99.91		99.84		99.78		99.71		99.92		99.66	
	25	37.5	99.67		99.79		99.74		99.1		99.64		99.72	

Robustness

With the intentional changes in the chromatographic conditions, such as determining wavelength and flow rate, the actual peak shifted minutely with so abrupt observations. The deliberate change in the wavelength resulted in nearly no swift change in the detection ability of the method. Quite similarly, the modified flow rate eluted similar amount of the drugs with no major difference. The % RSD values under the limit of $\pm 2\%$ indicated that the proposed method has desired levels of robustness and can be applied under varied conditions for analysis. The results of robustness study are depicted in **Table 4**.

Table 4: Robustness studies of the developed method for domperidone and esomeprazole.

% Estimation	Change in wavelength (± 2 nm)						Change in flow rate (± 0.2 ml/min)					
	ESO			DOM			ESO			DOM		
	299 nm	301 nm	303 nm	282 nm	284 nm	286 nm	0.8 ml/min	1 ml/min	1.2 ml/min	0.8 ml/min	1 ml/min	1.2 ml/min
Mean (%)	99.76	99.93	100.26	98.53	98.98	98.27	99.64	99.82	99.97	99.81	99.89	99.73
% RSD	0.13	0.04	0.11	0.06	0.01	0.13	0.27	0.22	0.19	0.14	0.17	0.16

System Suitability Parameters

The system suitability parameters revealed that the proposed developed RP-HPLC based chromatographic resolution method has the ability to estimate both the drugs in a capsule formulation in a sensitive and reproducible manner. The system exhibited mean theoretical plates of 3275 for ESO and 212 for DOM, which indicated that it fulfills the minimum pharmacopoeia limit of 2000, as per the minimum requirements of monographs of United States Pharmacopoeia (USP). Therefore, it may be considered that the method will express high column efficacy with better resolution. The system generated average peak area of 657570 for ESO and 1094081 for DOM represented a very high reproducibility and better separation efficacy. The tailing factor (TF) was just a little more than 1 in both the cases denoted good peak symmetry with no significant tailing can be noticed. It may be also be considered as an ideal Gaussian peak where both the factors (symmetry and asymmetry) are equal in the magnitude.

The retention times were found to be in optimized limits (< 10 min) and not too early in the chromatograph.

Therefore, the present developed method possesses a high degree of precision, reproducibility, robustness, efficacy, and economic for routine analysis of both the drugs in capsule formulations. The system suitability parameters are illustrated in **Table 5**.

Table 5: System suitability parameters.

Parameters	ESO	DOM
Plate Count	3275.48 \pm 0.69	2122.42 \pm 0.34
Tailing Factor	1.198 \pm 0.050	1.188 \pm 0.043
Retention Time (min)	4.386 \pm 0.0438	7.688 \pm 0.267
Peak area	657570 \pm 0.12	1094081 \pm 0.41

Limit of Detection and Quantification

The limit of detection (LOD) for ESO and DOM was detected to be 0.024 $\mu\text{g/mL}$ and 0.179 $\mu\text{g/mL}$, respectively. The limit of quantification (LOQ) for ESO and DOM was monitored to 0.072 $\mu\text{g/mL}$ and 0.544 $\mu\text{g/mL}$, respectively.

These outcomes signified that the proposed developed RP-HPLC method has an excellent propensity to sense the lowest concentration of both the drugs in the capsule formulation, simultaneously.

Estimation of ESO and DOM in Capsule Formulation

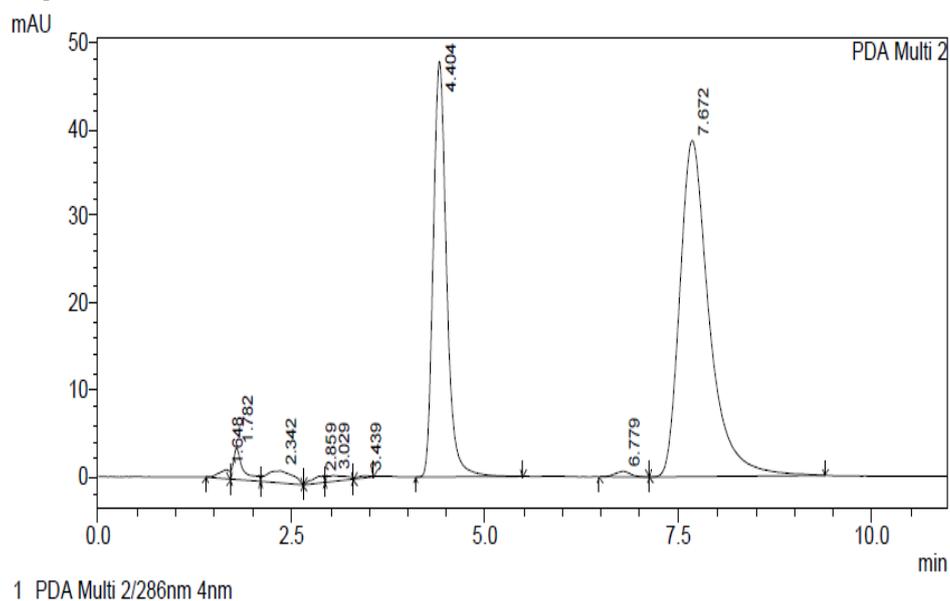
The developed method precisely detected the concentration of both ESO and DOM in the capsule formulation as indicated by large peak area of 648228 and 1082958, respectively. The % labeled claim for ESO and DOM were found to be 100.05 and 99.27 with % RSD values less than 2 % in both the cases. Thus, the method can be considered for simultaneous estimation of ESO and DOM in capsule owing to its attributes of precision, accuracy, and sensitivity in detecting drug components. The results of estimation are described in **Table 6**.

Table 6: Estimation of domperidone and esomeprazole in capsule formulation.

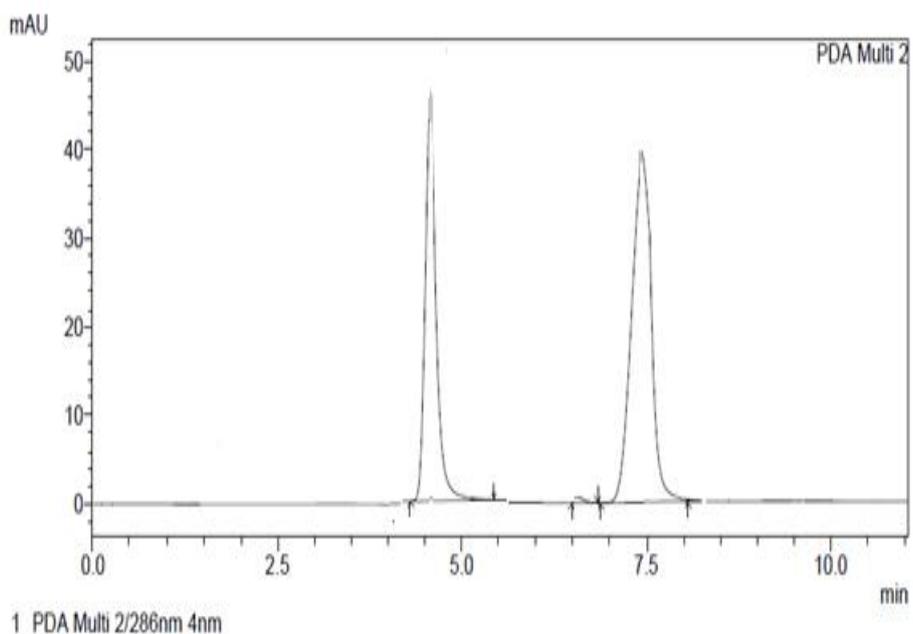
S. No	Weight of sample taken (mg)	Volume of sample taken ($\mu\text{g/mL}$)	Detector Response (Peak Area)				% Labeled Claim	
			ESO		DOM		ESO	DOM
			Sample	Standard (20 $\mu\text{g/mL}$)	Sample	Standard (30 $\mu\text{g/mL}$)		
1	143.12	20	649327		1076968		100.14	99.39
2	143.10	20	648642	648228	1073254	1082958	100.00	99.04
3	143.09	20	648794		1075859		100.03	99.28
4	143.13	20	648931		1076746		100.05	99.37
*Mean of 3 observations							Mean	100.05
						%RSD	0.06	0.16

Stability Studies

Based on the modified study of the degradation of both the drugs in capsule, the oxidative degradation was studied comprehensively. The degradation was a function of pH, temperature, and environmental impact. In the presence of H_2O_2 , the chemical penetrates the capsule shell (made of gelatin) and degrades the drugs present inside. The chromatogram displayed multiple degraded components at 1.624, 1.784, 2.342, 2.859, 3.029, and 3.439 at a very low magnitude after 3 hr of exposure (**Figure 3**). The plausible basis for the high degradation is a mechanistic abstraction of the proton by the OH radical. The degradation was noticed due to the weak ionized acid nature of the drugs which facilitates rapid degradation. In contrast to it, on further analysis of the UV induced degradation, the chromatogram depicted no such degradants. This may be due to the restriction of penetration of UV rays by the gelatin shell of the capsule.



(A)



(B)

Figure 3: Chromatogram depicting forced degradation studies under various conditions: (a) Oxidative degradation (b) Photolytic degradation.

CONCLUSION

The present novel developed analytical method utilizing the phosphate buffer (pH 8.5): acetonitrile (50:50) on a Lichrospher® 100 C₁₈ column by using a flow rate of 1 mL/min where an excellent resolution with sharp peaks of esomeprazole and domperidone present in capsule formulation was observed at 4.386 min and 7.688 min, respectively. The analytical method was validated in accordance with the ICH guidelines Q2A and Q2B where desired linearity, accuracy, precision, and robustness were observed. The system suitability parameters represented a very high reproducibility and better separation efficacy. In a modified stability study, the oxidative degradation was studied comprehensively where a mechanistic abstraction of the proton by the OH radical was predicted. The developed method was simple, precise, accurate, rapid, reasonably specific, and have desired ruggedness. The developed method can be conventionally used for quality control and routine analysis of drugs in pharmaceutical dosage forms in pharmaceutical industries and research laboratories.

CONFLICT OF INTEREST

Authors state that there is no conflict of interest regarding publication of this article.

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