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Determination of Domperidone and Omeprazole in Capsule Dosage form by UV/Visible Spectrophotometer

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In the present study, validation of quantitation of domperidone and omeprazole present in capsule formulation is carried out by using UV-visible spectrophotometry. According to ICH guidelines, the developed method was studied for specificity, accuracy, linearity, range precision, robustness and ruggedness. Determination of stability of the drugs in solution during analysis was studied. It was found that developed method obeyed Beer's law at two compound method. The concentration range of 5-10 µg/mL for domperidone and 2-10 µg/mL for omeprazole was suitable. The absorbance should be taken before 1 h due to stability reasons. The method is rapid, economic and meet ICH requirements for an analytical method for the quantification of drugs in a formulation.

Key Words: Domperidone, Omeprazole, Validation, Analytical method, Capsule dosage form.

INTRODUCTION

Combination of domperidone and omeprazole in capsule dosage form is used for the treatment of nausea, emesis and hyperacidity. Validation is a concept that has been evolving continuously since its first formal appearance in the United States[1,2]. Because of this, it has an intangible quality that has led to confusion and controversy, resulting in a rash of different definitions[3]. According to the Rules Governing Medicinal Products in the European community[4], validation is: '*Action of proving, in accordance with the principles of good manufacturing practice, that any procedure, process, equipment, material, activity or system actually leads to the expected results*'.

Further definitions are provided by the European Pharmaceutical Inspection Convention (PIC)[5,6], the federation internationale Pharmaceutique (FIP)[7] and the UK guide to Good Pharmaceutical Manufacturing Practice 1983 (Orange Guide)[8]. Reproducible and accurate analytical results are a prerequisite throughout pharmaceutical development and manufacturing[9,10]. Achieving these depends on the use of valid, robust methods. Critical factors that should be evaluated include: accuracy (as evidenced by selectivity, specificity and lack of bias), precision, recovery, linearity

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and system suitability[11]. In view of these importances, present study is undertaken to validate analytical method of domperidone and omeprazole in combination as capsule dosage form by UV/visible spectrophotometer.

EXPERIMENTAL

Domperidone and omeprazole were procured from Medispan Pharmaceutical Pvt. Ltd., Chennai, India. Its capsule dosage form was also obtained from the same source. Sodium hydroxide and methanol were obtained from Ranbaxy, New Delhi, India. All ingredients and reagents used were of analytical reagent grade and used as received.

RESULTS FOR DOMPERIDONE

Validation parameters	Preparations	Experimental values	Acceptance criteria	Inference
Specificity	Blank absorbance: 1.69	Absorbance: 1.1969	NMT 2.0 %	Complies
Precision	(i) Standard solution (ii) Sample solution	SD = 0.2941	NMT 2.0 %	Complies
Linearity	Linearity regression co-efficient	λ_{max} 293.8 = 0.999266 λ_{max} 306.4 = 0.999551	NMT 2.0 %	Complies
Range	(i) Level 1 solution (5 µg/mL) (ii) Level 2 solution (25 µg/mL)	5-25 µg/mL	NMT 2.0 %	Complies
Accuracy		% recovery		
	1. Level 1 solution	100.63		
	2. Level 2 solution	100.06		
	3. Level 3 solution	100.51		
	4. Level 4 solution	100.91	% Average = 100.40 recovery	Complies
	5. Level 5 solution	100.50		
	6. Level 6 solution	100.59		
	7. Level 7 solution	100.52		
	8. Level 8 solution	99.42		
	9. Level 9 solution	100.46		
Ruggedness precision	(i) Standard solution (ii) Sample solution	9.90 mg per capsule	% Average = 99.09 % Average omeprazole = 101.29	Complies
Robustness	(i) Standard solution (ii) Sample solution	10.06 mg per capsule	% Average = 100.86 % Average omeprazole = 100.99	Complies
Stability studies	Stability for 1 h	8.21 mg per capsule	Drug content: 82.13 %	Does not comply
	Stability for 4 h	8.21 mg per capsule	Drug content: 82.13 %	

NMT = Not more than, SD = Standard deviation.

Methods: The analytical method development for the proposed combination includes: Studies on possibility of simultaneous estimation of domperidone and omeprazole, spectral characteristic in different solvent selected, specificity precision, accuracy, robustness and ruggedness of the method for domperidone and omeprazole in combination.

Among solvents studied, sodium hydroxide methanol (1:1) mixture and sufficient amount of water was found suitable for analysis of domperidone and omeprazole.

For standard curve λ_{max} of 293 nm for domperidone and 306 nm for omeprazole was used.

Specificity: It was considered by comparing excipients solutions with the rest results.

RESULTS FOR OMEPRAZOLE

Validation parameters	Preparations	Experimental values	Acceptance criteria	Inference
Specificity	Blank absorbance: 1.104	Absorbance: 1.2104	NMT 2.0 %	Complies
Precision	(i) Standard solution (ii) Sample solution	SD = 0.1867	NMT 2.0 %	Complies
Linearity	Linearity regression co-efficient	λ_{max} 293.8 = 0.999408 λ_{max} 306.4 = 0.999613	NMT 2.0 %	Complies
Range	(i) Level 1 solution (2 µg/mL) (ii) Level 2 solution (10 µg/mL)	2-10 µg/mL	NMT 2.0 %	Complies
Accuracy	1. Level 1 solution 2. Level 2 solution 3. Level 3 solution 4. Level 4 solution 5. Level 5 solution 6. Level 6 solution 7. Level 7 solution 8. Level 8 solution 9. Level 9 solution	% recovery 100.66 100.70 100.21 99.49 100.93 100.63 100.18 99.02 99.25	% Average = 100.12 recovery	Complies
Ruggedness precision	(i) Standard solution (ii) Sample solution	20.25 mg per capsule	% Average = 101.29 % Average omeprazole = 99.09	Complies
Robustness	(i) Standard solution (ii) Sample solution	20.19 mg per capsule	% Average = 100.99 % Average omeprazole = 100.66	Complies
Stability studies	Stability for 1 h Stability for 4 h	18.22 mg per capsule 18.74 mg per capsule	Drug content: 91.14 % Drug content: 93.73 %	Does not comply

NMT = Not more than, SD = Standard deviation.

Linearity

For domperidone: It was carried out in 5 levels by taking 5, 10, 15, 20 and 25 mL of standard stock solution and diluting to 50 mL separately. Thus 5, 10, 15, 20 and 25 µg/mL solutions were produced, respectively.

For Omeprazole: For this drug for 5 levels, 2, 4, 6, 8 and 10 mL of standard stock solution were diluted to 50 mL separately to produce 2, 4, 6, 8 and 10 µg/mL concentrations, respectively.

Accuracy: To study the accuracy following concentrations of drugs were considered.

For both drugs, three concentration (150, 200 and 250 µg/mL were subjected to study for three levels, respectively. For each level, 10 mL of sample solution and 5, 10 and 15 mL separately of standard solution were diluted to 50 mL.

Precision: For precision study, 150, 200 and 250 µg/mL of drugs were prepared and absorbance was observed at 293-306 nm for each concentrations.

Range: Range for domperidone and omeprazole were taken 5-25 and 2-10 µg/mL, respectively.

Ruggedness: The ruggedness study was performed by conducting the precision study on different day. Different chemists used different lots reagents with freshly prepared sample and standard solution.

Robustness: The robustness was conducted on freshly prepared sample and standard solutions at two wavelength of 293.8-306.4 nm.

Stability: The absorbance for assay precision, solution of domperidone and omeprazole were measured at 293.8-306.4 nm for 4 h.

RESULTS AND DISCUSSION

The method obeys 'Beers' law at the two compound method. The concentration range for domperidone is from 5-25 μg/mL and for omeprazole from 2-10 μg/mL. The absorbance should be taken before 1 h due to stability problem.

The present analytical validation method is simple, rapid, economic and suited for routine quality.

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