IJBPAS, February, 2023, 12(2): 640-646

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

ESTIMATION OF FAMOTIDINE IN PHARMACEUTICALS – A REVIEW

SANTHIPRIYA Y*, SIVA PRASAD M, PRACHET P AND RAMA RAO N

Department of Pharmaceutical Analysis, Chalapathi Institute of Pharmaceutical Sciences, Chalapathi Nagar, Lam, Guntur-522034

***Corresponding Author: Santhipriya Yadavalli: E Mail: santhipriya724@gmail.com**

Received 29th March 2022; Revised 28th April 2022; Accepted 17th July 2022; Available online 1st Feb. 2023

https://doi.org/10.31032/IJBPAS/2023/12.2.6831

ABSTRACT

The main goal of this review is to give a quick overview of how to estimate Famotidine and its combination medications using various analytical techniques. Famotidine is a H_2 blocker that inhibits the formation of stomach acid. Peptic ulcer disease, gastric reflux disease, and Zollinger-Ellison syndrome are all treated with it. This study examines the analytical methods for estimating Famotidine in bulk drug and different formulations that have been reported in the literature so far, such as UV-Spectroscopy, High performance liquid chromatography (HPLC),and High performance Thin layer chromatography (HPTLC). Solvents, mobile phases, stationary phases, linearity range, flow rates, retention durations, and retardation factor are also discussed using various analytical methods in this review.

Keywords: Famotidine, Zollinger-Ellison syndrome, UV-Spectroscopy, HPLC, HPTLC

INTRODUCTION:

Many folks are afflicted by gastric reflux, which manifests itself as a burning sensation acknowledged variously as heartburn and acid indigestion. The preeminent remedy for this circumstance is famotidine. Famotidine is a H2 blocker to be had for the remedy of ulcers. It blocks H2 receptors placed on parietal cells and inhibit gastric acid secretions **[1]**. Famotidine competitive inhibition effects in decreased basal and nocturnal gastric acid discharge and a depletion in gastric content, acidity, and quantity of gastric acid released in reaction to stimuli together with caffeine, food, insulin, betazole and pentagastrin **[2]**. Famotidine (FMT) N2-

(aminosulfonyl)-3-[[[2[(diaminomethylene)amino]thiazol-4yl]methyl]thio]propanamidine and molecular system having $C_8H_{15}N_7O_2S_3$ **[3] (Figure 1)**. Analysis of records from 15 international locations has proven that famotidine is extra powerful than placebo in treating gastric ulcers. Relief of ache is executed in advance in famotidine-dealt with sufferers. Complete endoscopic restoration can be anticipated in sixty four to eighty percentages of sufferers **[4]**.

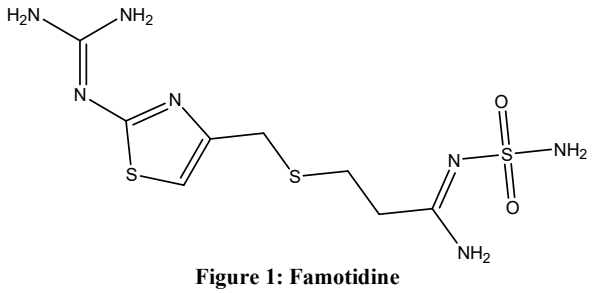

Figure 1: Famotidine

METHODS FOR ESTIMATION

UV Spectrophotometric methods

Various UV spectrophotometric methods for Famotidine single and mix with other drugs are developed and are listed in the **(Table 1).**

Chromatographic methods:

Various chromatographic methods like HPLC, HPTLC, ion chromatography GC, UPLC, was developed for estimation of Famotidine in single and mix with other drugs. Methods for estimation of HPLC and HPTLC are listed in the **(Table 2, 3)**.

Table 1: Methods for estimation of Famotidine single and mix with other drugs by UV Spectrophotometry

S. No.	DRUG	APPLICATION	DESCRIPTION	REFERENCE
1.	Famotidine	Formulations (tablets)	Detection wavelength : 260 nm Solvent : water Linearity range : 12.5-200 µg mL-1 Correlation coefficient: ±0.92	[5]
2.	Famotidine	Dosage forms (Bulk and tablet)	Detection wavelength: 266nm Solvent : 0.1 N HCl, pH 1.20 Linearity range : 5-30 µg/ml Correlation coefficient: 0.9998	[6]
3.	Ibuprofen and famotidine	Tablets	Detection wavelength : Ibuprofen : 272.8 nm Famotidine : 290 nm Solvent : methanol Linearity range : Ibuprofen : 100–600µg/mL Famotidine : 5–25µg/mL Correlation coefficient: Ibuprofen: 0.9992 Famotidine: 0.9990	[7]
4.	Famotidine and Ibuprofen	In pure and pharmaceutical dosage form	Detection wavelength : Ibuprofen : 224nm famotidine: 286nm Solvent : acetonitrile Linearity range : Ibuprofen : 4-20µg/ml Famotidine: 2-10µg/ml Correlation coefficient:	[8]

			Ibuprofen: 0.9958 **Famotidine: 0.9801**	
5.	**Famotidine and Dicyclomine HCl**	**Combined Tablet Dosage form**	**Detection wavelength :** **Famotidine:292nm** **Dicyclomine HCL :218nm** **Solvent :Methanol** **Linearity range :** **Famotidine: 20-120 µg/ml** **Dicyclomine HCL: 50-100 µg/ml** **Correlation coefficient:** **Famotidine: 0.998** **Dicyclomine HCL: 0.999**	**[9]**

Table 2: Methods for estimation of Famotidine single and mix with other drugs by HPLC

S. No.	DRUGS	APPLICATION	DESCRIPTION	REFERENCE
6.	**Famotidine**	**pharmaceutical products**	**Detection wavelength : 267 nm** **Mobile phase : methanol:1% acetic acid solution=30:7 (v/v)** **Flow rate : 0.4 mL/min** **Linearity range : 0.1 to 0.0001 mg mL-1** **Column : Nucleosil 100 C18** **Retention time:** **FAM: 4.16 min**	**[10]**
7.	**Famotidine and Domperidone**	**Pharmaceutical dosage form**	**Detection wavelength : 280 nm** **Mobile phase : Methanol: 0.1% ortho phosphoric acid in water (55:45% v/v)** **Flow rate: 1.0 mL/min.** **Linearity range : 2.5 to 50 µg/mL for both FAM and DOM** **Column : Phenomenex-C18 (4.6 mm id, 250 mm, 5µm)** **Retention time:** **FAM: 1.69 min** **DOM :3.23 min.**	**[11]**
8.	**Famotidine**	**pharmaceutical formulations**	**Detection wavelength : 265nm** **Mobile phase : 13:87 (v/v) acetonitrile–0.1 M dihydrogen phosphate buffer containing 0.2% triethylamine (pH 3.0)** **Flow rate : 1 mL min−1** **Linearity range : 1 and 80µg mL−1** **Column : Supelcosil LC18 column** **Retention time: 1.20 min**	**[12]**
9.	**Ibuprofen & Famotidine**	**Bulk as well in pharmaceutical dosages form**	**Detection wavelength: 236nm.** **Mobile phase : Sodium Dihydrogen Ortho Phosphate and the pH has been adjusted to 2.5 by Orthophosporic Acid & Acetonitrile in the ratio of 30:70 v/v** **Flow rate: 1.2 ml/min.** **Linearity range :** **Ibuprofen : 100 to 200ppm** **Famotidine : 3.32-6.65 ppm** **Column : C18** **Retention time:** **Ibuprofen : 1.887 min** **Famotidine : 3.615 min**	**[13]**
a **10.**	**Ibuprofen and Famotidine**	**Tablet dosage form**	**Detection wavelength:** **Ibuprofen : 263 nm** **Famotidine : 360 nm** **Mobile phase : methanol and water pH 3.0** **flow rate : 1 mL/min** **Linearity range :** **Ibuprofen : 3-21 µg/mL** **Famotidine : 0.1-0.7 µg/mL** **Column : Qualisil BDS C8 column** **Retention time:** **Ibuprofen: 6.34 ± 1.53**	**[14]**

			Famotidine : 21.76 ± 0.38 min	
11.	**Ibuprofen and Famotidine**	**pharmaceutical dosage form**	**Detection wavelength: 280 nm Mobile phase: acetonitrile and 0.5 M potassium dihydrogen phosphate buffer pH 2.2 adjusted with ortho-phosphoric acid (25:75). Flow rate : 1.2 ml/min Linearity range: Ibuprofen : 20 – 160µg/ml Famotidine : 0.68 – 5.4µg/ml Column: C8 Retention time: Ibuprofen : 3.19 min Famotidine : 8.37 min**	**[15]**
12.	**Moxifloxacin, Cimetidine, Famotidine and Ranitidine**	**Bulk and formulations**	**Detection wavelength: Cimetidine : 236nm Famotidine:270nm Ranitidine :310nm Mobile phase: methanol: water: ACN, 60:45:5 v/v/v, pH 2.7 Flow rate : 1.0 mL min-1 Linearity range: Moxifloxacin and H2 receptor antagonists : 0.078-5.000 µg mL-1 Column: Purospher STAR C18 (250 x 4.6 mm, 5 mm) Retention time: Moxifloxacin : 6.75 ± 0.05 Cimetidine : 5.29 ± 0.06 Famotidine :4.70 ± 0.09 Ranitidine : 4.70 ± 0.29**	**[16]**

Table 3: Methods for estimation of famotidine single and mix with other drugs by HPTLC

S. No.	DRUGS	APPLICATION	DESCRIPTION	REFERENCS
13.	**Ibuprofen and famotidine**	**pharmaceutical dosage form**	**Detection wavelength: 264 nm Mobile phase: methanol: ethyl acetate: hexane: ammonia (2:6:1:0.5, v/v/v/v) Stationary phase: HPTLC aluminum plates precoated with silica gel 60F_{254} Linearity range: Ibuprofen: 320–9600 ng/band Famotidine: 10–300 ng/band Rf value: Ibuprofen : 0.41 ± 0.02 Famotidine: 0.69 ± 0.02**	**[17]**
14.	**Paracetamol, Diclofenac Potassium, and Famotidine**	**Tablet**	**Detection wavelength: 274 nm Mobile phase: toluene–acetone–methanol–formic acid (5 + 2 + 2 + 0.01, v/v/v/v) Stationary phase: HPTLC aluminum plates precoated with silica gel 60F254 Linearity range: Paracetamol: 1625–9750 ng/spot Diclofenac sodium: 250–1500 ng/spot Famotidine: 100–600 ng/spot Rf value: Paracetamol: 0.62 ± 0.03 Diclofenac potassium 0.75 ± 0.02 Famotidine: 0.17 ± 0.03.**	**[18]**
	Famotidine,	**Combined Tablet**	**Detection wavelength: 256 nm Mobile phase: chloroform-methanol-ethyl acetate-acetic acid (21.5:16.1:59.1:3.2%, v/v/v/v) Stationary phase: TLC aluminum plates precoated with silica gel 60F-254 Linearity range: Famotidine: 160–960 ng per spot**	**[19]**

15.	**Paracetamol, and Ibuprofen**	**Dosage Forms**	**Paracetamol: 400–2400 ng per spot Ibuprofen: 600–3600ng per spot Rf value: Famotidine: 0.21 ± 0.01, Paracetamol: 0.80 ± 0.02 Ibuprofen: 0.89 ± 0.01**	
16.	**Famotidine and Domperidone**	**Bulk drug and formulation**	**Detection wavelength: 280 nm Mobile phase: n-butanol: water 6: 1(v/v) Stationary phase: aluminum plates precoated with silica gel 60 F254 Linearity range: Famotidine: 200-1200 ng.spot -1 Domperidone: 100-600 ng.spot -Rf value: Famotidine: 0.27±0.01 Domperidone: 0.58±0.01**	**[20]**

CONCLUSION:

The extensive varieties of Methods are to be had in estimation of Famotidine in bulk drug and in unique pharmaceutical dosage forms. From the evaluation of documented records out of a majority of these strategies HPLC with UV detection became considerably used with solvents like Methanol, Acetonitrile and Phosphate buffer for higher resolution with a flow rate of 0.6-1.5 ml/min due to the fact this method gives reliable, unique and low price in assessment with extra superior technology. This evaluate centered on a synopsis of the current state of the art in terms of analytical strategies for figuring out Famotidine.

ACKNOWLEDGEMENT:

Chalapathi Institute of Pharmaceutical Sciences, Lam, Guntur, has been really helpful in giving me with the necessary assistance, guidance, and facilities.

REFERENCES:

[1] Erum Zaheer, Sohail Hassan, Development and Validation of a UV Spectrophotometric method for determination of famotidine in suspensions, FUUAST Journal of biology, 4(1), 2014, 7-12.

[2] Rishikesh Gupta, Sunil Kumar Prajapati, Formulation and evaluation of novel stomach specific floating microspheres bearing famotidine for treatment of gastric ulcer and their radiographic study, Asian pacific journal of tropical biomedicine,4(9), 2014, 729-735.

[3] Helali.N, Darghouth .F, RP-HPLC Determination of Famotidine and its Potential Impurities in Pharmaceuticals, Chromatographia, 60(7), 2004, 455-460.

[4] David T. Lyon, Efficacy and safety of famotidine in the management of benign gastric ulcers, The American journal of medicine,81(4),1986,33-41.

[5] Safila Naveed, Farya Zafar, UV Spectrophotometric Assay of

Famotidine Formulations, American Journal of Pharmacy and Pharmacology, 1(3), 2014, 28-31.

[6] Ritesh Kumar, Amrish Chandra, Development and validation of ultraviolet spectrophotometric method for quantitative estimation of famotidine in bulk and tablet dosage form, Asian journal of pharmaceutical and clinical research, 10 (8) , 2017, 381-385.

[7] Dimal A. Shah, Dixita J. Suthar, Estimation of ibuprofen and famotidine in tablets by second order derivative spectrophotometry method, Arabian journal of chemistry, 10, 2017, S105-S108.

[8] Nyola Narendra, Govinda Samy Jeyabalan,Simulteneous estimation of Famotidine and Ibuprofen in pure and pharmaceutical dosage form by UV-VIS spectroscopy, International research journal of pharmacy, 3(4), 2012, 277-280.

[9] S J Wadher, T M Kalyankar, Simultaneous Determination of Famotidine and Dicyclomine HCl in combined Tablet Dosage form by UV Spectrophotometer, Research journal of pharmacy and technology,10(2), 2017, 408-413.

[10] Adriana Nita, Lucian Copolovici , HPLC-UV Method for Determination of Famotidine from Pharmaceutical Products, Revista de **C**himie**,** 69(2), 2018, 297-299.

[11] Aruna k vanka, Anilkumar voodikala, Development and validation of RP - HPLC method for simultaneous estimation of famotidine and domperidone in pharmaceutical dosage form, International Journal of Pharmacy and Pharmaceutical Sciences, 5(1), 2013, 223-227.

[12] Helali N, Darghouth F, RP-HPLC Determination of Famotidine and its Potential Impurities in Pharmaceuticals, Chromatographia, 60(7), 2004, 455-460.

[13] A. Kumar S , Debnath M, A new rp-hplc stability indicating method development and validation for simultaneous estimation of ibuprofen & famotidine in bulk as well in pharmaceutical dosages form by using PDA detector, International journal of pharmaceutical sciences and research, 5(9), 2014, 3829-3839.

[14] Yogita B Wani, Dipak D Patil, A Stability Indicating RP-HPLC Method for Simultaneous Determination of Ibuprofen and Famotidine, Analytical Chemistry: An Indian Journal, 16(13), 2016, 1-16.

[15] Peikova L, Georgieva M, Rp-hplc method for simultaneous determination of ibuprofen and famotidine in Pharmaceutical dosage form, Pharmacia, 61(2), 2014, 3-6.

[16] Najma Sultana, Mahwish Akhtar, Simultaneous determination of Moxifloxacin and H2 receptor antagonist in pharmaceutical dosage formulations by RP-HPLC: application to in vitro drug interactions, Química Nova, 34 (4), 2011, 683-688.

[17] Dimal A. Shah, Dixita J. Suthar**,** Development and validation of hptlc method for estimation of ibuprofen and famotidine in pharmaceutical dosage form, Journal of liquid chromatography & related technologies, 37(7), 2014, 941-950.

[18] Laxman D. Khatal, Asmita Y. Kamble, Validated HPTLC Method for Simultaneous Quantitation of Paracetamol, Diclofenac Potassium, and Famotidine in Tablet Formulation, Journal of AOAC international, 93(3), 2010, 765-770.

[19] Nitin Dubey, Dinesh Kumar Jain, Stability-Indicating HPTLC Method for Simultaneous Estimation of Famotidine, Paracetamol, and Ibuprofen in Combined Tablet Dosage Forms, Journal of planar chromatography, 25, 2012, 162–167.

[20] M. Pawar S, S. Patil B, Validated HPTLC method for simultaneous quantitation of famotidine and domperidone in bulk drug and formulation, International Journal of Advances in Pharmaceutical Sciences, 1(1), 2010, 54-59.