



EVALUATION AND VALIDATION OF A UPLC METHOD FOR THE STABILITY INDICATING ASSAY OF DULOXETINE IN TABLET DOSAGE FORM USING UPLC-MS/MSⁿ

Mohammed Sayeed Uddin^{1*}, Dr. Osman Ahmed¹, Syeda Rakhshinda Zareen¹, Reshma¹ and Dr. Anas Rasheed²

¹Department of Pharmaceutical Analysis, Deccan School of Pharmacy, Hyderabad.

²CSO, Gaelib Medications Private Limited, Hyderabad.

***Corresponding Author: Mohammed Sayeed Uddin**

Department of Pharmaceutical Analysis, Deccan School of Pharmacy, Hyderabad.

Article Received on 09/12/2022

Article Revised on 29/12/2022

Article Accepted on 19/01/2023

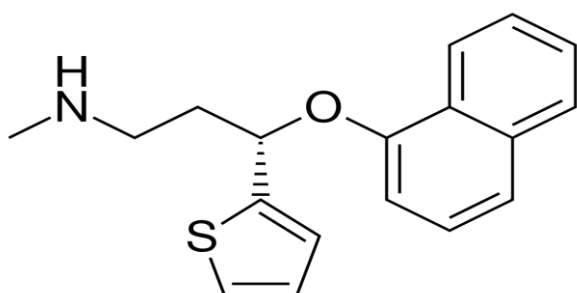
ABSTRACT

An inhibiting effect of duloxetine on serotonin and norepinephrine reuptake is possible. It has been approved for use in the United States by the Food and Drug Administration (FDA) for the alleviation of major depressive disorder and diabetic peripheral neuropathy pain. Specificity, system compatibility, linearity, accuracy, and precision of the disclosed approach have all been rigorously.

KEYWORDS: Duloxetine, USFDA and Validation.

INTRODUCTION

Duloxetine HCl (+) - (s)-N-methyl-3-(1naphthoxy)-3-(thiophen-2-yl)-propan-1-amine (The Merck Index, 2001) is a potential dual inhibitor of the reuptake of serotonin and norepinephrine (SSNRI). It has been approved by the US Food and Drug administration (USFDA) for the treatment of major depressive disorder and for the diabetic peripheral neuropathic pain. It belongs to the class narcoleptics.



Chemical structure of duloxetine

Weight: 297.42 g·mol⁻¹

Chemical formula

C₁₈H₁₉NOS

IUPAC

(+)-(S)-N-Methyl-3-(naphthalen-1-yloxy)-3-(thiophen-2-yl)propan-1-amine.

Experimental

Methodology

Method validation

What we mean when we talk about "the analytical technique" is the method by which the analysis is carried out. All of the analytical procedures should be spelled out in great detail. The sample, the reference standard, and the reagents, as well as their preparations, the use of the equipment, the development of the calibration curve, the application of the formulas for the calculation, etc. There has been comprehensive validation of the disclosed technique for its specificity, system appropriateness, linearity, accuracy, precision, limit of detection, limit of quantification, and robustness.

RESULTS

Preparation of standard stock solution

Preparation of diluent

The Dope was measured out at a weight of 10 mg and weakened with a volume of 100 ml of versatile stage to form a 100 µg/ml stock arrangement of working arrangement. That had been measured to get ready for disintegration in versatile stage is included to the jar, and the Droxoled, and permitted to blend, taken after by sonication, which causes it to break down. In this case, the arrangement was sonicated for 10 minutes and after that sifted through a 0.2µ channel.

Accuracy procedure

Duloxetine						
Level %	Amount Added (µg/ml)	Amount Found (µg/ml)	% Recovery	Mean Recovery (%)	Std. Dev	% RSD
50	02.23	02.17	97.30	97.58	0.30805	0.32%
100	04.47	04.36	97.53			
150	06.71	06.57	97.91			

Recovery level	Set No.	Duloxetine	
		Wt. Taken (µg/ml)	Amount found (µg/ml)
50%	Set 1	02.21	02.19
	Set 2	02.24	02.21
	Set 3	02.27	02.25
100%	Set 1	04.42	04.39
	Set 2	04.46	04.43
	Set 3	04.50	04.48
150%	Set 1	06.71	06.67
	Set 2	06.73	06.71
	Set 3	06.75	06.72

System precision

Parameters	Duloxetine
Theoretical plates ± % RSD	6055.11 ± 0.50
Asymmetry ± % RSD	1.08 ± 0.05
Repeatability (% RSD)	0.07

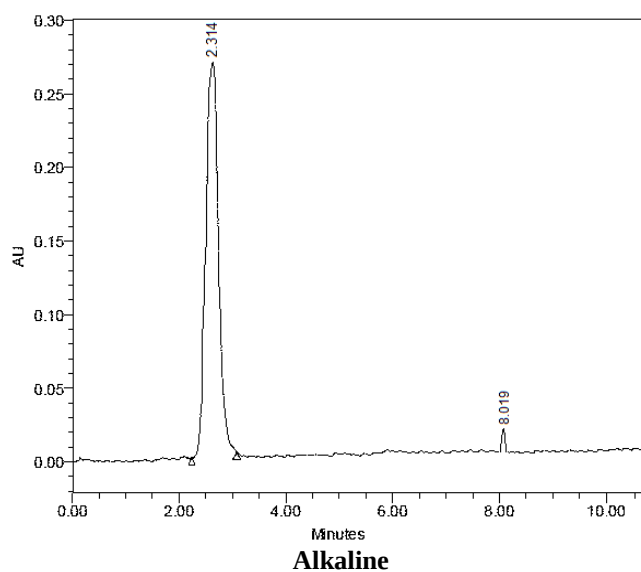
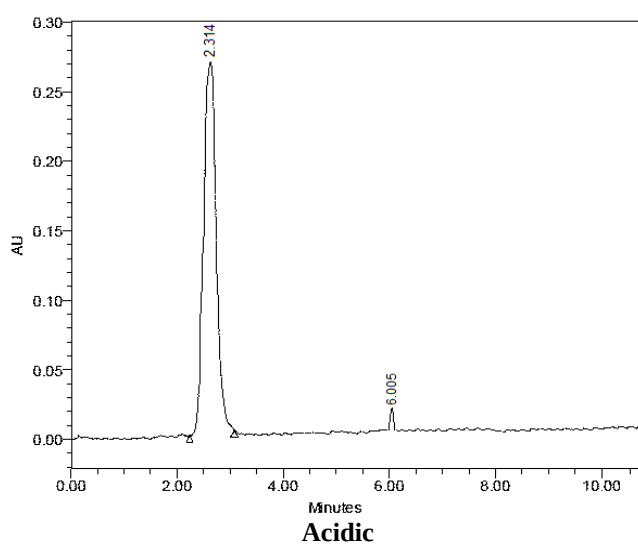
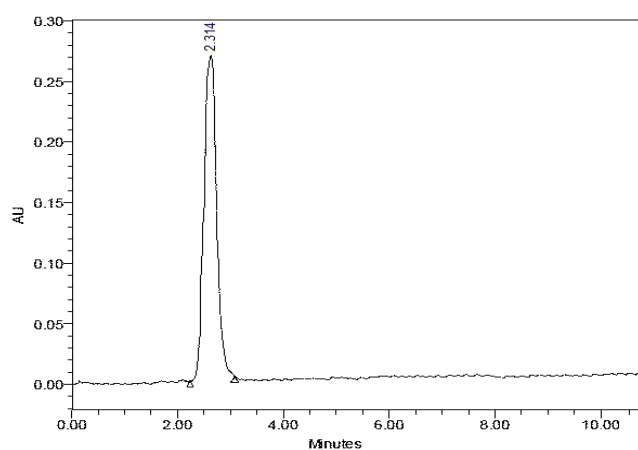
Method precision

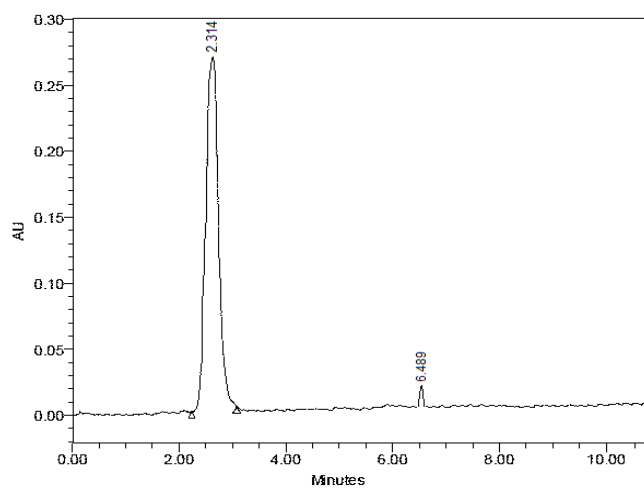
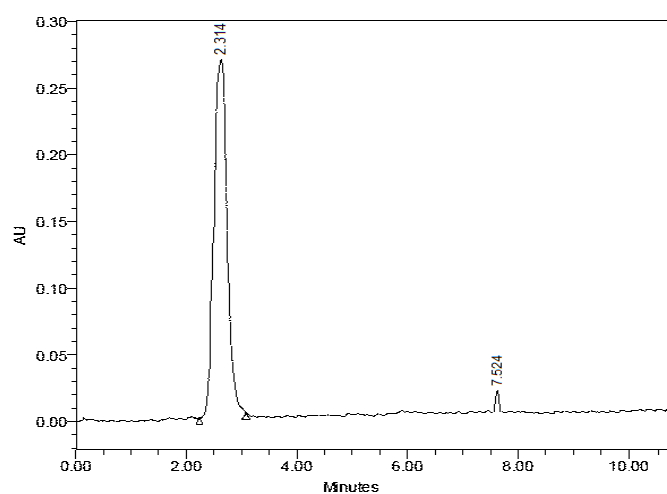
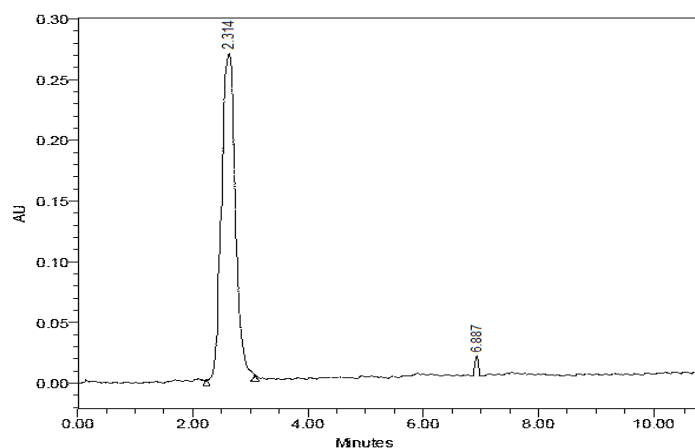
Replicate	Duloxetine		
S. No.	Concentration taken (µg/ml)	Area	%LC
1	04.00	437888	99.98%
2		437973	99.96%
3		437947	99.97%
4		437846	99.99%
5		438248	99.90%
6		437849	99.99%
Average			99.96%
Std. Dev			0.03391
% RSD			0.03%
Standard weight			4mcg
Standard potency			99.99%

Robustness

Robustness Studies			
Parameter	Value	Peak Area	% RSD
Flow Rate	Low	438364	0.02%
	Actual	438425	
	Plus	438536	
Temperature	Low	438734	0.07%
	Actual	438856	
	Plus	439339	
Wavelength	Low	438638	0.10%
	Actual	438741	
	Plus	439436	

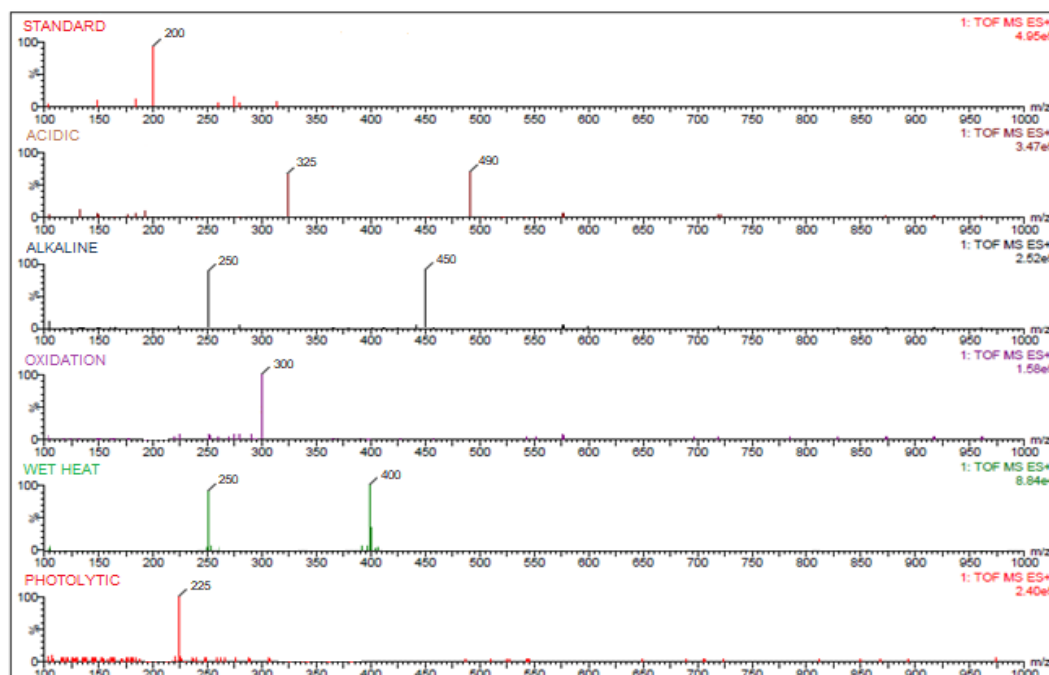
Stability assay studies Sample control



**Oxidation****Photolytic****Wet heat****Evaluation of methods****Assay studies****➤ Stability indicating analysis of duloxetine**

Conditions	% claim
Sample control	97.50%
Acidic	93.74%
Alkaline	96.72%
Oxidation	94.19%

Photolytic	95.42%
Wet Heat	94.29%



Analyte	Observed ion mass (Da)	Proposed formula	Calculated mass (Da)
Unknown	200.02	C ₈ H ₉ NO ₅	199.16
Duloxetine	297.74	C ₁₈ H ₁₉ NOS	297.41
Unknown	400.45	C ₂₀ H ₂₂ NO ₈	404.39
Unknown	450.87	C ₂₂ H ₂₈ NO ₉	450.46
Unknown	490.72	C ₂₃ H ₂₄ NO ₁₁	490.44

CONCLUSION

The dose distribution pattern in bulk pharmaceutical and applications, and in particular for this medication, required the development of an innovative, precise, and specialised ultra chromatographic technology. This was done in order to analyse the pattern. This aim, which has connotations of therapy, may be accomplished by using a basic assessment technique that does not interfere with the actual application of the approach. This is possible because of the connotations treatment has. The high impact and recurrence of this tactic, together with the fact that it maintains its accuracy, make it an efficient and easy method to implement. It appeared, on the basis of the evidence that was at hand, that the procedure was adequate for authorising the particular approval criteria that were given.

REFERENCES

1. Y. C. Mayur*, Osman Ahmad, V. V.S. Rajendra Prasad, M. N. Purohit, N. Srinivasulu, S. M. Shanta Kumar, "Synthesis of 2-Methyl N¹⁰-Substituted Acridones as Selective Inhibitors of Multidrug Resistance (MDR) Associated Protein in Cancer Cells". Medicinal Chemistry, Bentham Science Publishers, 2008; 4, 5: 457-465(9).
2. Osman Ahmed*, Pankaj Sharma, Jaya Sharma, "Synthesis and Pharmacological Study of Azetidinone Derivatives" International Journal of Pharmaceutical Science & Education, 2013; 11-18.
3. Osman Ahmed*, Pankaj Sharma, Jaya Sharma, Dr. Indrajeet Singhvi, "Synthesis and Anticonvulsant Activity of Some Substituted Azetidinone Derivatives" Asian Journal of Pharmaceutical Research and Development, 2013; 5.
4. Osman Ahmed*, Dr. Md Salahuddin, Vinutha. K, Pankaj Sharma. "Design, Synthesis and Biological Evaluation of Some Novel Substituted Thiazolidinone Derivatives as Potent Antihyperglycemic Agents". International Journal of Pharmaceutical Research Scholars, 2013; 2: 3.
5. Osman Ahmed*, Md Salahuddin, Pankaj Sharma, Indrajeet Singhvi "Synthesis and biological investigations of some new thiazolidinone derivatives as anti-tubercular agents", American Journal of Pharmtech Research, 2013; 3: 193-201.
6. Osman Ahmed*, Md. Salahuddin, Iffath Rizwana, M.A.Aleem, Pankaj Sharma, "Synthesis,

- Characterization and Biological Evaluation of Novel thiazolidinone derivatives as Anti-inflammatory Agents", *Indo American Journal of Pharmaceutical Research*, 2013; 3(10): 8121-8126.
7. Osman Ahmed*, Pankaj Sharma, Indrajeet Singhvi. "Synthesis and Anti-Hyperglycemic activity of Some Novel Thiazolidinone Derivatives". *Indo American Journal of Pharmaceutical Research*, 2014; 4(02): 1008-1014.
 8. Osman Ahmed*, Pankaj Sharma, Indrajeet Singhvi. "Anticonvulsant Activity of Some Novel Substituted Thiazolidinone Derivatives against Maximal Electro Shock Induced Seizure". *International Journal of Pharmaceutical Research Scholars*, 2014; 3(1): 289-294.
 9. Osman Ahmed*, Mohd Haseeb Ur Rahman, Abdul Najeeb, Sk. Md. Noorullah, S.A.Azeez Basha, Design, "Synthesis and Anti-inflammatory activity of certain fused Novel Thienopyrimidines Derivatives", *International Journal of Pharmaceutical Research Scholars*, 2013; 2(4): 82-87.
 10. Syed Aamer Ali, SK Danda, Syed Abdul Azeez Basha, Rasheed Ahmed, Osman Ahmed, Mohd Muqtader Ahmed. "Comparision of uroprotective activity of reduced glutathione with Mesna in Ifosfamide induced hemorrhagic cystitis in rats". *Indian Journal of Pharmacology* 2014; 46: 105-108.
 11. Osman Ahmed*, Syed Azeemuddin Razvi, T K Md Rayees, M A Nafay Shoeb, Md Salahuddin. "Synthesis Characterization and Anti-inflammatory activity of some substituted pyrimidine derivatives". *Indo American Journal of Pharmaceutical Research*, 2014; 4(05): 2301-2306. DOI: 10.1044/1980-iajpr.14369.
 12. Osman Ahmed*, Farhana Begum, Nishat Fatima, Md. Salahuddin. "Synthesis and Biological Activity of Some Novel Pyrimidine Derivatives". *International Journal of Pharmaceutical Research Scholars*, 2014; 3(4): 103-108.
 13. Ms. Farhana Begum, Osman Ahmed, Md. Salahuddin, Nishat Fatima. "Synthesis, Characterization and Anti-Hyperglycemic Activity of Novel Pyrimidine Derivatives". *Indo American Journal of Pharm Research*, 2014; 4(11): 5501-5506. DOI: 10.1044/1980-iajpr.141042
 14. Osman Ahmed*, Mehruq Fatima, Juveriya Parveen, Asma Farheen, Ayesha Binth Saleh, Dr. Syed Mahmood Ahmed. Changes in Pulmonary Function Test (PFT) Before and After Adding Tiotropium Bromide to the Ongoing Therapy of Severe Persistant Asthmatics. *Indo American Journal of Pharm Research*, 2015; 5(01). DOI: 10.1044/1980-iajpr.141266.
 15. Mohd Khader, Mohd Mahboob Shareef, Syeda Huda Noorain, Osman Ahmed. Synthesis, Characterization and Biological Activity of Some Novel Pyrimidine Derivatives. *Indo American Journal of Pharm Research*, 2015; 5(03).
 16. Fayeza Batool, Osman Ahmed, Anas Rasheed. An Assay Method for the Simultaneous Estimation of Acetaminophen and Tramadol using RP-HPLC Technology. *Indo American Journal of Pharmaceutical Research*, 5(7): 2605-2610.
 17. Fayeza Batool, Osman Ahmed, Anas Rasheed. A Stability Indicating Method for the Simultaneous Estimation of Acetaminophen and Tramadol in Pharmaceutical Dosage Form. *American Journal of PharmTech Research*, 2015; 5(04): 674-683.
 18. Humeera Rafeeq, Talath Fatima, Afiya Ansari, Osman Ahmed. Personalized Medicine - A Boon For Treating Rheumatoid Arthritis. *Indo American Journal of Pharmaceutical Research*, 5(8).
 19. Humeera Rafeeq, Osman Ahmed, M.A Khaleq, Samee A, Amer M. Progress In The Treatment of Neuroblastoma. *Indo American Journal of Pharmaceutical Research*, 5(8).
 20. Talath Fatima, Osman Ahmed, Amer Mahboob, Afiya Ansari, Amatullah Fathimah. Personalized Medicine - A Review – Progress In The Treatment of Non Small Cell Lung Cancer (NSCLC) In A New Era of Personalised Medicine. *Indo American Journal of Pharmaceutical Research*, 5(8).
 21. Talath Fatima*, Osman Ahmed, Afiya Ansari, Amatullah Fathimah, Amer Mahboob. Novel Therapeutic Approaches to a Chronic Inflammatory Disorder – Asthma. *International Journal of Pharmaceutical Research Scholars*, 2015; 4(3): 112-117.
 22. Humeera Rafeeq*, Osman Ahmed, Sohail Ali, Mohd Younus, Mohd Bilal. A Review on Mowat-Wilson Disorder, *International Journal of Pharmaceutical Research Scholars*, 2015; 4(3): 176-181.
 23. Humeera Rafeeq*, Osman Ahmed, Fayeza Ameen, Amreen Sultana, Maryam Fatima. A Review on Harlequin Ichthyosis. *International Journal of Pharmaceutical Research Scholars*, 2015; 4(3): 189-193.
 24. Anees Begum*, Osman Ahmed. An Assay Method for the Simultaneous Estimation of Albuterol and Ipratropium Bromide using RP- HPLC Technology. *International Journal of Pharmaceutical Research Scholars*, 2016; 5(4): 33-37.
 25. Anas Rasheed*, Osman Ahmed. UPLC Method Optimisation and Validation for the Estimation of Sodium Cromoglycate in Pressurized Metered Dosage Form, *International Journal of Applied Pharmaceutical Sciences and Research*, 2017; 2(2): 18-24. <http://dx.doi.org/10.21477/ijapsr.v2i2.7774>