World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 6.129

EVALUATION AND VALIDATION OF A UPLC METHOD FOR THE STABILITY INDICATING ASSAY OF ARIPIPRAZOLE IN BULK DOSAGE FORM

Dr. Osman Ahmed*[1], Reshma[1], Syeda Rakhshinda Zareen[1], Mohammed Sayeed Uddin[1] and Dr. Anas Rasheed[2]

[1]Department of Pharmaceutical Analysis, Deccan School of Pharmacy, Hyderabad.
[2]CSO, Gaelib Medications Private Limited, Hyderabad.

Corresponding Author: Dr. Osman Ahmed
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

A medicine that is used to treat psychosis will alter the way that specific chemicals in the brain operate. Patients suffering from psychiatric conditions such as schizophrenia and manic depression may get relief from the drug's ability to reduce the symptoms of their condition. Atypical antipsychotic aripiprazole has a mechanism of action that is distinct from that of other atypical antipsychotics that have been approved by the FDA.

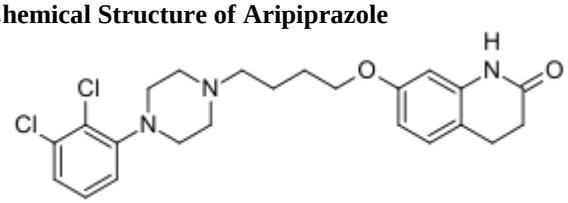
KEYWORDS: Aripiprazole, schizophrenia and FDA.

INTRODUCTION

Aripiprazole is an antipsychotic medication, works by changing the actions of chemicals in the brain. It is used to treat the symptoms of psychotic conditions such as schizophrenia and bipolar disorder (manic depression). Aripiprazole possess a different mechanism of action which is different from other FDA – approved atypical antipsychotics approved by Food and Drug Administration. Instead of acting as an antagonist at D_2 receptor it acts as a partial agonist at the D2 receptor. It also acts as the partial agonist at the 5-HT_1A receptor but exhibits the role of the antagonist at 5-HT_2A receptor similar to that of the other atypical anti-pshycotics.

Aripiprazole also possess high affinity towards 5-HT_7 receptor (acts as antagonist) and 5-HT_2C receptor (acts as a partial agonist). Its action on the 5-HT_7 receptor and 5-HT_2C receptor is found to be the main cause of weight gain of the patient during the treatment period. Aripiprazole also possess moderate affinity for histaminergic, α-adrenergic, dopaminergic receptors and serotonin transporter. It has a very less affinity for muscarinic acetyl choline receptors. The main aim and objective of this work is to perform the physical, chemical characterization (in-vitro dissolution profile) and accelerated stability studies for the optimized lab scale batch to formulate a stable and robust formulation of aripiprazole immediate release tablets of strength 30mg, which is used in the treatment of schizophrenia and bipolar disorders.

Chemical Structure of Aripiprazole



Weight: 383.51 g·mol−1
Chemical Formula $C_{23}H_{27}Cl_2N_3O_2$
IUPAC 7-{4-[4-(2,3-Dichlorophenyl)piperazin-1-yl]butoxy}-3,4-dihydroquinolin-2(1H)-one

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

In arrange to achieve partition beneath ideal circumstances taking after a arrangement of exploratory

trials, it is essential to summarize the comes about. A stationary stage such as the Hypersil BDS C18 (100 mm x 2.1 mm, 1.7 m) column was the foremost fitting since it generated symmetrical crests with tall determination and an awfully great affectability, as well as an awfully great determination and affectability. The stream rate was kept steady at 0.25 mL min-1, coming about in great determination. The response of Aripiprazole to the PDA finder was explored, and it was found that the ideal wavelength was 210 nm, which had the most prominent affectability.

Accuracy Procedure

Aripiprazole						
Level %	**Amount added (µg/ml)**	**Amount found (µg/ml)**	**% Recovery**	**Mean recovery (%)**	**Std.Dev**	**% RSD**
50	09.95	09.75	97.98	98.61	0.6977	0.71%
100	19.90	19.60	98.49			
150	29.85	29.66	99.36			

Recovery level	**Set No.**	**Aripiprazole**	
		Wt. Taken (µg/ml)	**Amount found (µg/ml)**
50%	**Set 1**	09.45	09.22
	Set 2	09.75	09.68
	Set 3	09.95	09.81
100%	**Set 1**	19.55	19.33
	Set 2	19.70	19.63
	Set 3	19.90	19.80
150%	**Set 1**	29.44	29.30
	Set 2	29.62	29.57
	Set 3	29.85	29.81

System Precision

Parameters	**Aripiprazole**
Theoretical plates ± % RSD	2116.94 ± 0.50
Asymmetry ± % RSD	1.05 ± 0.05
Repeatability (% RSD)	0.15

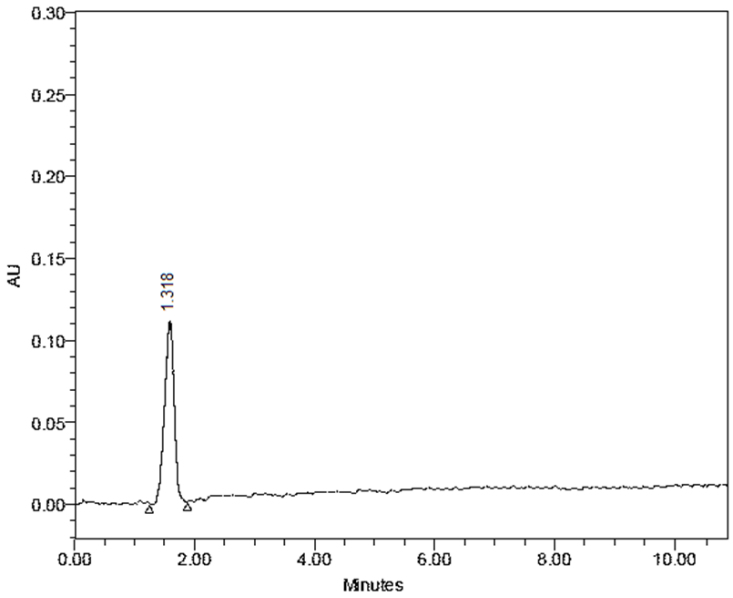
Method Precision

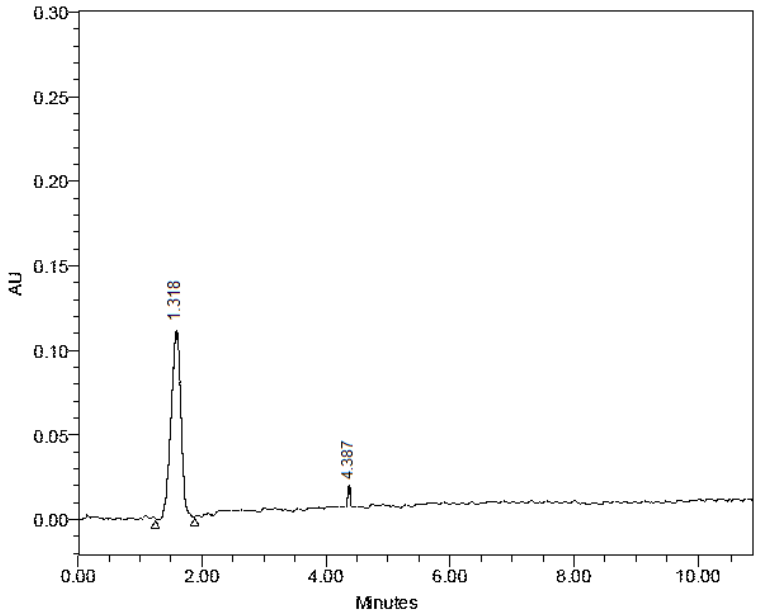
Replicate	***Aripiprazole***		
S. No.	**Concentration Taken (µg/ml)**	**Area**	**%LC**
1	25.68	4546389	98.90%
2		4552071	98.77%
3		4554099	98.71%
4		4556291	98.68%
5		4558244	98.64%
6		4555351	98.70%
Average			98.73%
Std.Dev			0.0920
% RSD			0.09%
Standard weight			25.68mcg
Standard potency			98.90 %

Robustness

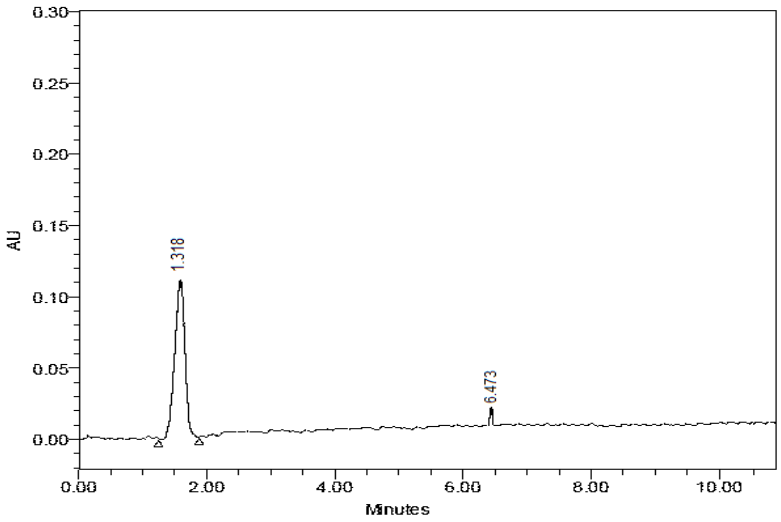
Robustness Studies			
Parameter	**Value**	**Peak Area**	**% RSD**
Flow Rate	**Low**	4557141	0.03%
	Actual	4559365	
	Plus	4560043	
Temperature	**Low**	4558912	0.01%
	Actual	4559724	
	Plus	4560254	
Wavelength	**Low**	4558864	0.01%
	Actual	4559671	
	Plus	4560113	

Stability Assay Studies
Sample Control

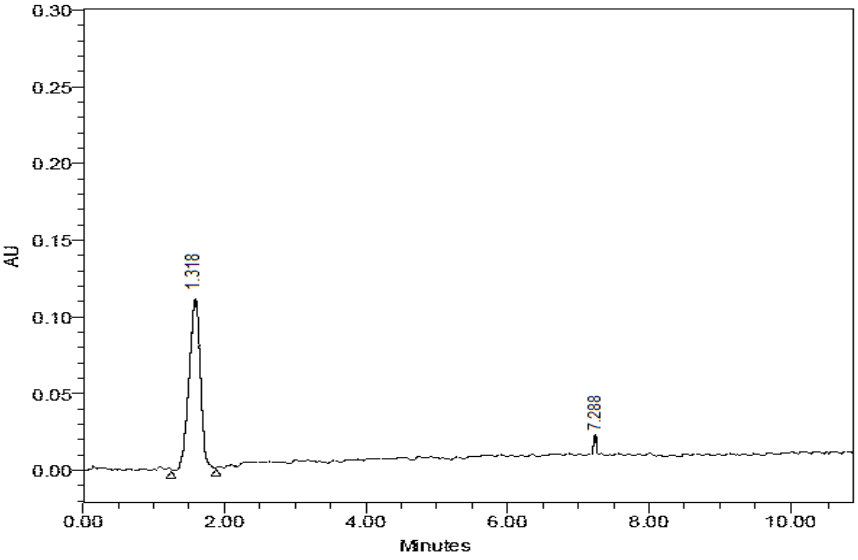




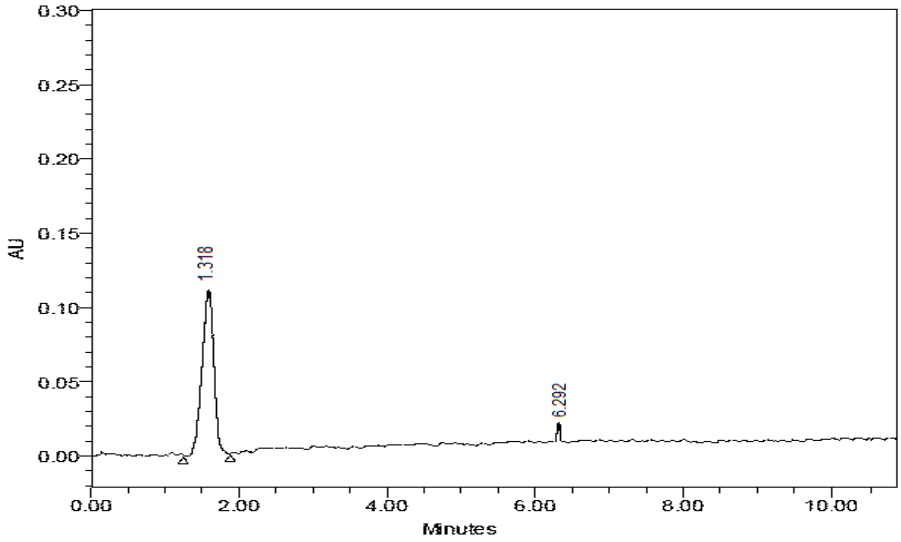
Acidic



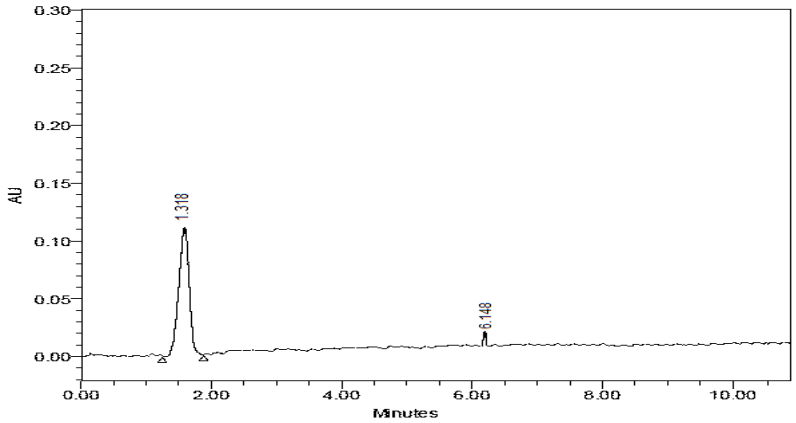
Alkaline



Oxidation



Photolytic



Wet Heat

Evaluation of Methods

Assay Studies

- **Stability Indicating Analysis of Aripiprazole**

Conditions	% claim
Sample Control	98.73%
Acidic	95.88%
Alkaline	96.13%
Oxidation	96.44%
Photolytic	95.19%
Wet Heat	96.54%

CONCLUSION

For this drug in particular, a novel, accurate, and specialised ultra chromatographic technique was needed to account for the uneven dosing patterns that occur in bulk pharmaceutical and applications. This was done so that the pattern could be examined. With a simple evaluation method that doesn't get in the way of the treatment, this therapeutic goal may be reached. Since "therapy" has so many negative associations, it allows for this. This strategy is both effective and straightforward to adopt because to its high impact and frequency, as well as the fact that it retains its accuracy. The available information suggested that the method was sufficient for authorising the stated approval criteria.

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 N^{10}-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: 10.1044/19 80-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 Asthamatics. 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; V-4,I-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; V-4, I-3: 176-181.
23. Humeera Rafeeq*, Osman Ahmed, Fayeeza Ameen, Amreen Sultana, Maryam Fatima. A Review on Harlequin Ichthyosis. International Journal of Pharmaceutical Research Scholars, 2015; V-4, I-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; V-5, I-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.
26. Anas Rasheed*, Osman Ahmed. UPLC Method Development and Validation for the Determination of Chlophedianol Hydrochloride in Syrup Dosage Form. International Journal of Applied Pharmaceutical Sciences and Research, 2017; 2(2): 25-31. http://dx.doi.org/10.21477/ijapsr.v2i2.7775.
27. Anas Rasheed*, Osman Ahmed. Validation of a Forced Degradation UPLC Method for Estimation of Beclomethasone Dipropionate in Respules Dosage Form. Indo American Journal of Pharmaceutical Research, 2017; 7(05).
28. Anas Rasheed*, Osman Ahmed. Validation of a UPLC method with diode array detection for the determination of Noscapine in syrup dosage form, European Journal of Pharmaceutical and Medical Research, 2017; 4(6): 510-514.
29. Anas Rasheed*, Osman Ahmed. Stability indicating UPLC method optimisation and validation of Triamcinolone in syrup dosage form. World Journal of Pharmaceutical and Life Sciences, 2017; 3(4): 200-205.
30. Anas Rasheed*, Osman Ahmed. Stability indicating UPLC method optimisation and validation of Pholcodine in bulk dosage form. European Journal of Biomedical and Pharmaceutical Sciences, 2017; 4(6): 572-579.