International Journal of Chemistry and Pharmaceutical Sciences
ISSN: 2321-3132 | CODEN (USA): IJCPNH
Available online at:http://www.pharmaresearchlibrary.com/ijcps

Analytical Method Development and Validation for Haloperidol and Seroquel combine pharmaceutical dosage forms by RP-HPLC

Kuchipati Venkata Siva Prasad*[1], V. Haribaskar[2]

[1]*PG Research Scholar, Department of Pharmaceutical Analysis, Ratnam Institute of Pharmacy, Nellore, A.P.*
[2]*Professor, Department of Pharmaceutical Chemistry, Ratnam Institute of Pharmacy, Nellore, A.P.*

ABSTRACT

The proposed HPLC method was found to be simple, specific, precise, accurate, rapid and economical for simultaneous estimation of Haloperidol and Seroquel in tablet dosage form. The developed method was validated in terms of accuracy, precision, linearity, robustness and ruggedness, and results will be validated statistically according to ICH guidelines. The Sample recoveries in all formulations were in good agreement with their respective label claims. From literature review and solubility analysis initial chromatographic conditions Mobile phase ortho phosphoric acid buffer: Methanol 65:35 were set (Buffer P^H 2.45 adjusted with Triethylamine), Kromosil C18(250×4.6mm, 5µ) Column, Flow rate 1.0 ml/min and temperature was ambient, eluent was scanned with PDA detector in system and it showed maximum absorbance at 254 nm. As the methanol content was increased Haloperidol and Seroquel got eluted with good peak symmetric properties. The retention times for Haloperidol and Haloperidol was found to be 2.589 min and 3.711 min respectively. System suitability parameters were studied by injecting the standard five times and results were well under the acceptance criteria. Linearity study was carried out between 50% to150 % levels, R^2 value was found to be as 0.999. By using above method assay of marketed formulation was carried out, 100.7% was present. Full length method was not performed; if it is done this method can be used for routine analysis of Haloperidol and Seroquel.

Keywords: HPLC, Haloperidol, Seroquel, Ortho Phosphoric Acid Buffer: Methanol, Kromosil C 18.

ARTICLE HISTORY: Received 21 January 2022, **Accepted** 25 February 2022, **Available Online** 3 April 2022

Citation: Kuchipati Venkata Siva Prasad, *et al. Analytical Method Development and Validation for Haloperidol and Seroquel Combine Pharmaceutical Dosage Forms by RP-HPLC, Int. J. of Chem. and Pharm. Sci., 10(1), 2022: 27-31.*

CONTENTS:

Corresponding author
Kuchipati Venkata Siva Prasad
PG Research Scholar,
Department of Pharmaceutical Analysis,
Ratnam Institute of Pharmacy, Nellore, A.P.

1. Introduction

A phenyl-piperidinyl-butyrophenone that is used primarily to treat schizophrenia and other psychoses. It is also used in schizoaffective disorder, delusional disorders, ballism, and tourette syndrome (a drug of choice) and occasionally

as adjunctive therapy in mental retardation and the chorea of huntington disease. It is a potent antiemetic and is used in the treatment of intractable hiccups.

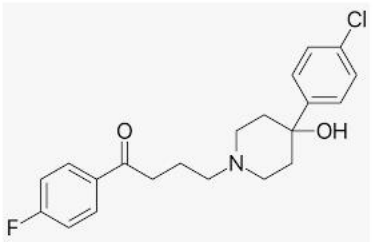

Figure 1

IUPAC Name: 4-[4-(4-chlorophenyl)-1,2,3,6-tetrahydro pyridin-1-yl]-1-(4-fluorophenyl)butan-1-one

Chemical formula: $C_{21}H_{23}ClFNO_2$

Molecular weight: 357.849

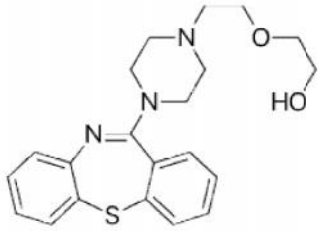

Figure 2

Quetiapine's antipsychotic activity is likely due to a combination of antagonism at D2 receptors in the mesolimbic pathway and 5HT2A receptors in the frontal cortex. Antagonism at D2 receptors relieves positive symptoms while antagonism at 5HT2A receptors relieves negative symptoms of schizophrenia.

Chemical name: 2-(2-(4-dibenzo[b,f][1,4]thiazepine- 11-yl-1-piperazinyl)ethoxy)ethanol

Molecular formula: $C_{21}H_{25}N_3O2S$

Molecular weight: 383.5099 g/mol

2. Methodology

Trial-1

Chromatographic conditions

Column : Symmetry C18 4.6x150mm, 5µm

Mobile phase ratio: ACN: H_2O (70:30%v/v)

Detection wavelength: 240nm

Flow rate: 1ml/min

Injection volume : 10µl

Run time: 5min

Retention time: 1.250 min&1.496 min

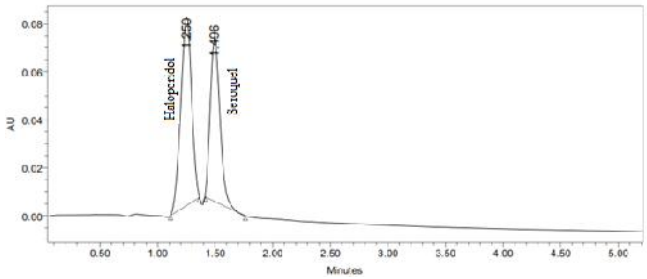

Figure 3. Chromatogram showing trial 1 injection

Observation: The trial shows no proper separation of peaks in the chromatogram, so more trials were required for obtaining peaks.

Trial - 2

Chromatographic conditions

Column: Inertsil C18 4.6x150mm 5µm

Mobile phase ratio: Methanol: H_2O (70:30%v/v)

Detection wavelength: 230 nm

Flow rate: 1ml/min

Injection volume : 10µl

Column temperature: Ambient

Auto sampler temperature: Ambient

Run time: 10.0 min

Retention time: 1.536 min & 3.584 mins

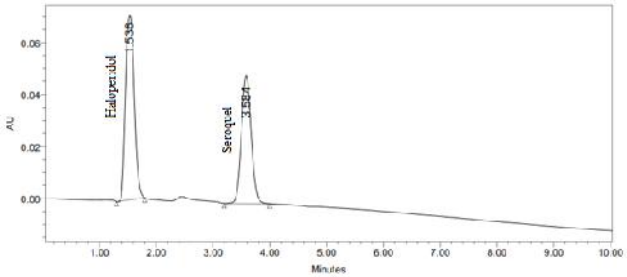

Figure 4. Chromatogram showing trial-2 injection

Observation: In this trial both peaks were eluted well, but there was no proper baseline. Need some more trails.

Optimized method

Chromatographic conditions

Column Agilent column (4.6×150mm) 5µ

Mobile phase ratio: ACN: Phosphate buffer pH 4.0(70: 30 % v/v)

Detection wavelength: 230 nm

Flow rate: 1.0ml/min

Injection volume : 10µl

Column temperature: Ambient

Auto sampler temperature: Ambient

Run time: 10min

Retention time: 2.462 & 3.737 mins

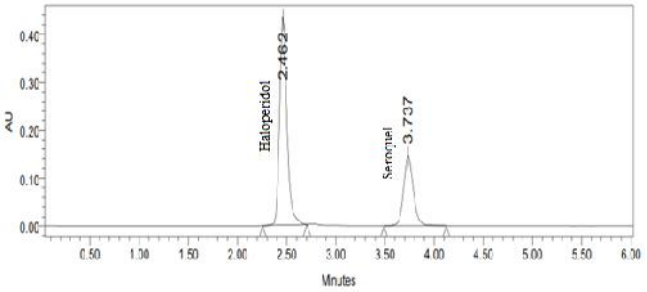

Figure 5. Optimized chromatogram

Observation: The separation was good, peak shape was good, so we conclude that there is no required for reduce the retention times of peaks, so it is taken as final method.

Preparation of phosphate buffer

2.95 grams of $KH_2PO_4$and 5.45 grams of K_2HPO_4 was weighed and taken into a 1000ml beaker, dissolved and diluted to 1000ml with HPLC water and pH was adjusted to 3 with ortho phosphoric acid. The resulting solution was sonicated and filtered.

Preparation of mobile phase

Mix a mixture of above buffer 300 ml (30%) and 700 ml of methanol (HPLC grade-70%) and degassed in ultrasonic water bath for 5 minutes. Filter through 0.22 µ filter under vacuum filtration.

Diluents preparation

Mobile phase was used as the diluent.

Preparation of the individual Haloperidol standard preparation: 10 mg of Haloperidol working standard was accurately weighed and transferred into a 10 ml clean dry volumetric flask and add about 2 ml of diluent and sonicate to dissolve it completely and make volume up to the mark with the same solvent (Stock solution).Further pipette out 0.2 ml from the above stock solution into a 10 ml volumetric flask and was diluted up to the mark with diluent. Final concentration is 20µg/ml.

Preparation of the individual Seroquel standard preparation: 10 mg of Seroquel hcl working standard was accurately weighed and transferred into a 10 ml clean dry volumetric flask and add about 2ml of diluent and sonicate to dissolve it completely and make volume up to the mark with the same solvent (Stock solution).Further pipette out 0.2ml from the above stock solution into a 10ml volumetric flask and was diluted up to the mark with diluent. Final concentration is 20µg/ml.

Preparation of the Haloperidol and Seroquel standard and sample solution

Sample solution preparation: An equivalent tablet power such that 5 mg of Haloperidol and 2 mg Seroquel hcl tablet powder were accurately weighed and transferred into a 10 ml clean dry volumetric flask, add about 2ml of diluent and sonicate to dissolve it completely and making volume up to the mark with the same solvent(Stock solution). Further pipette 1ml of the above stock solution into a 100ml volumetric flask and was diluted up to the mark with diluent. (Concentration is 50 ppm for Haloperidol and 20 ppm for Seroquel)

Standard solution preparation: 5 mg Haloperidol and 2 mg Seroquel hcl working standard was accurately weighed and transferred into a 10ml clean dry volumetric flask and add about 2ml of diluent and sonicate to dissolve it completely and make volume up to the mark with the same solvent (Stock solution).Further pipette out 1ml of the above stock solution into a 10ml volumetric flask and was diluted up to the mark with diluent. (Concentration is 50ppm for Haloperidol and 20 ppm for Seroquel)

Procedure:10µL of the blank, standard and sample were in jected into the chromatographic system and areas for the Haloperidol and Seroquel the peaks were used for calculating the % assay by using the formulae.

System suitability

- Tailing factor for the peaks due to Haloperidol and Seroquel in standard solution should not be more than 1.5.
- Theoretical plates for the Haloperidol and Seroquel peaks in standard solution should not be less than 2000.

3. Results and Discussion

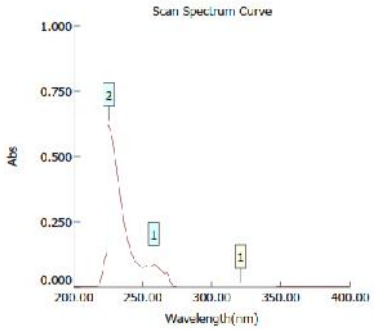

Figure 6. Spectrum showing wavelength of Haloperidol

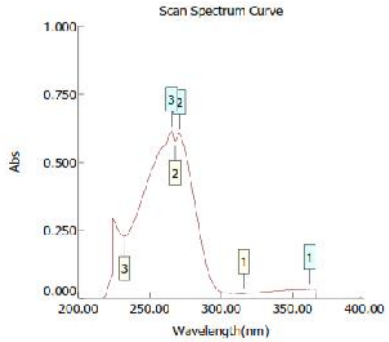

Figure 7. Spectrum showing wavelength of Seroquel

Optimized chromatographic conditions for simultaneous estimations of Haloperidol and Seroquel by RP-HPLC method

Column: Agilent C18 (4.5×150 mm) 5.0 µm
Column temperature: Ambient
Wavelength: 230 nm
Mobile phase ratio: (70:30) ACN: phosphate buffer
Flow rate: 1 ml/min
Auto sampler temperature: Ambient
Injection volume : 10µl
Run time: 10.0 minutes

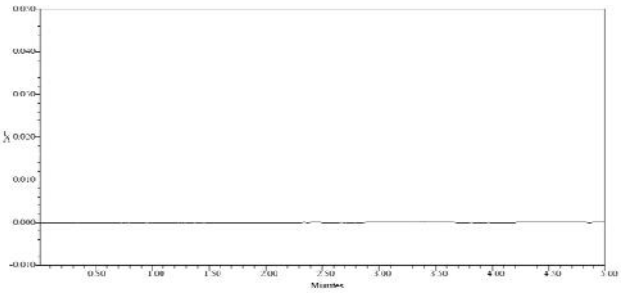

Figure 8. Chromatogram showing blank preparation (mobile phase)

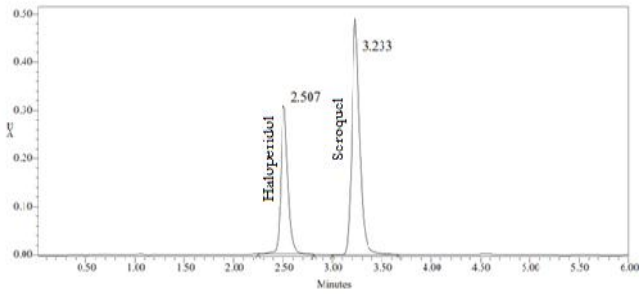

Figure 9. Chromatogram showing standard injection

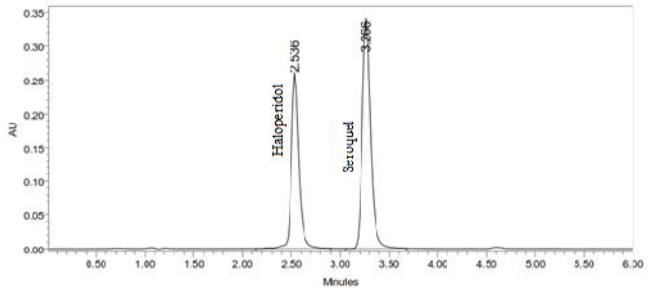

Figure 10. Chromatogram showing sample injection

Table 1. Results for intermediate precision of Seroquel

S.No	Peak name	RT	Area
1	Seroquel	3.230	859395
2	Seroquel	3.239	856248
3	Seroquel	3.246	854757
4	Seroquel	3.257	858139
5	Seroquel	3.271	857066
Mean			857121
Std.dev			1584.995
%RSD			0.184921

Table 1. Results for intermediate precision of Haloperidol

	Peak name	RT	Area
1	Haloperidol	2.506	4663690
2	Haloperidol	2.516	4609383
3	Haloperidol	2.519	4642290
4	Haloperidol	2.531	4653384
5	Haloperidol	2.544	4635880
Mean			4640925
Std.dev			18415.67
%RSD			0.39681

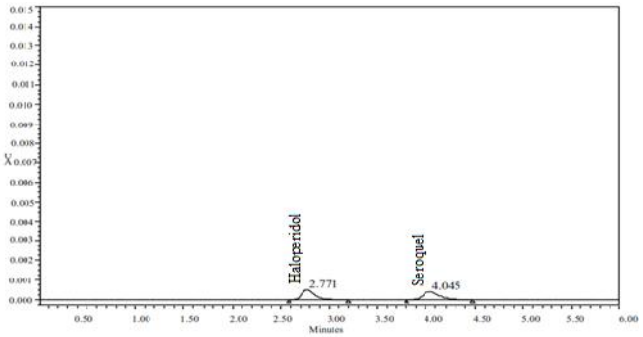

Figure 11. Showing results LOD

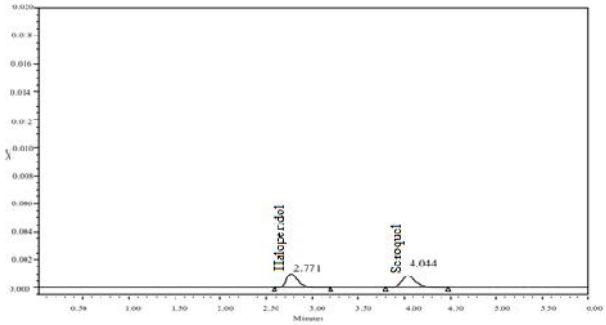

Figure.12 Showing results LOQ

4. Conclusion

A new method was established for simultaneous estimation of haloperidol and seroquel by RP-HPLC method.The chromatographic conditions were successfully developed for the separation of Haloperidol and Seroquel by using Agilent column (4.6×150mm)5µ, flow rate was 1ml/min, mobile phase ratio was (70:30 v/v) ACN: phosphate buffer(KH2PO4and K2HPO4) phosphate pH 3 (pH was adjusted with orthophosphoricacid), detection wavelength was 230nm. The instrument used was WATERS HPLC Auto Sampler, separation module 2695, photo diode array detector 996, Empower-software version-2. The retention times were found to be 2.427mins and 4.432mins. The % purity of Haloperidol and Seroquel was found to be 99.87% and 100.27% respectively. The system suitability parameters for Haloperidol and Seroquel such as theoretical plates and tailing factor were found to be 2733, 1.6 and 3500 and 1.4, the resolution was found to be 4.6. The analytical method was validated according to ICH guidelines (ICH, Q2 (R1)). Hence the suggested RP-HPLC method can be used for routine analysis of Haloperidol and Seroquel in API and Pharmaceutical dosage form.

5. References

[1] Dr. Kealey and P.J Haines, Analytical Chemistry, 1stedition, Bios Publisher, (2002), PP 1-7.

[2] A.BraithWait and F.J.Smith, Chromatographic Methods, 5thedition, Kluwer Academic Publisher, (1996), PP 1-2.

[3] Andrea Weston and Phyllisr. Brown, HPLC Principle and Practice, 1st edition, Academic press, (1997), PP 24-37.

[4] Yuri Kazakevich and Rosario Lobrutto, HPLC for Pharmaceutical Scientists, 1stedition, Wiley Interscience A JohnWiley & Sons, Inc., Publication, (2007), PP 15-23.

[5] Meyer V.R. Practical High-Performance Liquid Chromatography, 4th Ed. England, John Wiley & Sons Ltd, (2004), PP 7-8.

[6] Sahajwalla CG a new drug development, vol 141, Marcel Dekker Inc., New York, (2004), PP 421–426.

[7] Snyder LR practical HPLC method development, 2nd edition. John Wiley and sons, New York, (1997), PP 180-182.

[8] S.P.Wate, A.A.Borkar, RP-HPLC Estimation of Haloperidol and Trihexyphenidyl in Tablets. International Journal of Chem Tech Research, Vol.1, No.3, pp 675-676, July-Sept 2009.

[9] Dammalapati, Srikantha; Rudra Raju, Ramesh Raju, a Rp-Hplc Method for Simultaneous Determination of Haloperidol and Trihexyphenidyl Hydrochloride in Tablet Dosage Form. Source,Asian Journal of Pharmaceutical & Clinical Research;2014 Supplement 2, Vol. 7, p14

[10] Dhara Patel, Jayvadan Pate, Development and Validation of Rp-Hplc Method for Simultaneous Estimation of Risperidone and Trihexyphenidyl Hydrochloride in Tablet Dosage Forms. International Journal of Pharmaceutical Sciences Review and Research, Volume 4, Issue 3, September – October 2010; Article 015.

[11] G.K. Anthony, Ramya Sri.S, Development and Validation of Rp-Hplc Method for Simultaneous Estimation of Risperidone and Haloperidol in Tablet Dosage Forms. Int. J. Pharm Drug Anal Vol: 2 Issue: 9, 666-671.