

Development and validation of dissolution test for tamsulosin hydrochloride pellets

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(Received: July 27, 2008; Accepted: September 09, 2008)

ABSTRACT

A simple and rapid dissolution test for Tamsulosin Hydrochloride pellets 0.2% has been developed and validated. Based on the stability and basic nature of the drug, dissolution experiments were conducted at pH 1.2 and pH 7.2 with paddle stirring at 100 rotations per minute (rpm). Dissolution was found to be less than 40% over a period of 2 hours, between 55 and 75% till 3 hours and more than 85% 5 hours. The quantitative recovery of the drug from semi formulations was established indicating non interference of excipients. The dissolution profile for pellets was considered satisfactory and could be applied for quality control of Tamsulosin Hydrochloride Pellets 0.2% since there is no such report available.

Key words: Dissolution test, tamsulosin hydrochloride pellets.

INTRODUCTION

Tamsulosin Hydrochloride is used for the treatment of the signs and symptoms of benign enlargement of the prostate. Chemically Tamsulosin Hydrochloride is known as (-)-(R)-5-{2-[2-[(4-ethoxyphenoxy)ethyl]amino]propyl}-2-Methoxybenzenesulfonamide. It is not reported in any of the pharmacopoeias. A survey of literature reveals that HPLC methods^{1,2,3} are reported for the determination of Tamsulosin Hydrochloride, In Development and optimization of a novel oral controlled delivery system for tamsulosin hydrochloride using response surface methodology, Chiral separation of tamsulosin by capillary electrophoresis and Voltammetric investigation of Tamsulosin. How ever there is no HPLC method reported for its estimation in commercial dosage form. Hence a reverse phase HPLC method for the determination of Tamsulosin Hydrochloride in pharmaceutical solid dosage form is described.

METHODS

Instrument

High performance liquid chromatograph, Shimadzu 2010 Rheodyne injector with 100µl Loop LC solution computer based data station.

Chemicals and Reagents

Reference standard Tamsulosin Hydrochloride is procured from M/S. Suven Life Sciences, Acetonitrile HPLC (E-Merck), Perchloric acid AR (E-Merck.) were used.

Stationery phase

Inertsil ODS 3V (5microns, 15cm x 4.6mm).

Mobile phase preparation

Perchloric acid preparation

Perchloric acid solution

Mix 30.5 ml Perchloric acid with 95 ml

water and add 10.5 gm sodium hydroxide. Make up to 1000 ml with water and homogenize.

Mix 100 ml Perchloric acid solution with about 565 ml water and homogenize. Adjust pH=2.0 with 1N sodium hydroxide solution or with perchloric acid solution. Make up with water to 700 ml add 300 ml acetonitrile and then filtrated under vaccum through a 0.45µm nylon filter.

Internal standard preparation

Water (700ml.), Acetonitrile (300ml.) Propyl parahydroxybenzoate (10mg.) were mixed in a 250 ml volumetric flask. Dissolve in 75 ml Acetonitrile and make up to volume with water. Homogenize the solution. Transfer 10.0 ml into a 50 ml volumetric flask and make up to volume with solvent.

Medium 1

Dissolve 20.0g Sodium Chloride in one lt. of dilute Hydrochloric acid. Make up to 10litre with demineralized water. This solution is colourless and clear, and its pH is about 1.2.

Medium 2 (Phosphate buffer pH 7.2)

Dissolve 68.05g Potassium dihydrogenphosphate and 13.92g Sodium hydroxide in 1000ml water. Make up with demineralized water to 10.0 litre. Check whether the pH 7.2. Adjust pH

to 7.2 , if necessary.

Dissolution

The dissolution is performed according to Ph.Eur., (paddle method) with a sinker at 100rpm using 500 ml of medium 1 (37°C ± 0.5) to which 1.0 ml polysorbate 80 aqueous solution is added just before starting of the test. And then Immerse the pellets into the dissolution vessel. After 2 hours take exactly 10.0 ml.(by pipette) of the test solution, that is sample 1.

Replace all of the test solution immediately by 500ml of medium 2 (Phosphate buffer pH=7.2), previously warmed to 37°C (± 0.5). At 3 hours after starting the test (to be exact, at 1 hour after replacement of Medium 1) take exactly 10.0 ml of the test solution, that is sample 2.

Immediately add the same volume of Medium 2 (Phosphate buffer pH= 7.2), previously warmed to 37°C (± 0.5) in to the vessel. At 5 hours after starting the test (to be exact, at 3 hours after replacement of Medium 1) take exactly 10.0 ml of the test solution, That is sample 3.

Standard preparation

Weigh accurately about 25mg Tamsulosin.Hydrochloride into a 50ml volumetric

Table 1: The results are tabulated as follows

Semi formulation	Media	BOWL NOS	% Release	Average	Limits	SD	RSD
P EL L ET S	pH 1.2	1,2,3,4,5	24.54%,24.6%,		Not more than		
	buffer 2 nd Hour	and 6	24.64%,24.33% 24.55%,25.02%	24.6%	40.0%	0.2065	0.0508
	Phosphate buffer pH 7.2buffer 3 rd Hour	1,2,3,4,5 and 6	62.28%,63.27%, ,64.86%,65.39 %,63.95%,64.3 0%	64.0%	Between 55.0 to 75.0%	1.021	0.6535
	Phosphate buffer pH 7.2buffer 5 th Hour	1,2,3,4,5 and 6	92.96%,92.70% ,90.84%,91.77 %,92.06%,91.7 5%	92.0%	Not less than 85.0%	0.6922	0.6369

flask. Dissolve in about 30 ml solvent and make up to volume with the solvent. Homogenize the solution, pipette 4 ml of it into a 100 ml volumetric flask, make up to volume with medium and homogenize. Pipette 4 ml of this solution into a 100 ml volumetric flask, make up to volume with medium 1 and homogenize. Pipette 10 ml of this solution into a vessel, to this add 2 ml internal standard solution and homogenize. Use this as the standard solution. Filter the supernatant into a brown-colored auto sampler vial with 0.45µm nylon filter. With continuous shaking, make up to volume with solvent and homogenize. Transfer 2.0 ml into 50 ml volumetric flask and make up to volume with mobile phase and homogenize. Bring a part of the solution in brown coloured auto sampler vials.

Pipette 10.0 ml of this solution into a vessel, add 2.0 ml internal standard solution and homogenize Inject.

Sample solution

Sample 1

Filtrate the solution obtained 2 hours after start of the dissolution test using a 0.45µm nylon

filter. Discard the first 5 ml of the filtrate and use the subsequent filtrate as the sample solution T1. Pipette 5.0 ml of this solution into a vessel, add 1.0 ml internal standard solution and homogenize Inject.

Sample 2 and sample 3

At 10.0 ml of test solution obtained after 3 and 5 hours after starting the test, add 1.0ml of 0.5N HCl. Mix and filter through a 0.45 µm nylon filter. Discard the first 5 ml of each filtrate and from the remaining solution inject 100µl (Solution T2 Resp. T3).

Pipette 5.0 ml of this solution into a vessel, add 1.0 ml internal standard solution and homogenize Inject.

Calibration

100µl of the above working standard solutions are injected at a time interval of 15 minutes. Evaluation is performed with UV detector at 220nm. The retention time is found to be around 6.618 minutes for Tamsulosin and internal standard 12.313 minutes. Peak areas are recorded and the calibration graph is obtained by plotting peak areas versus concentration.

Dissolution

100µl of standard and sample solutions are injected into an injector of liquid chromatograph. The amount of Tamsulosin Hydrochloride calculated by comparing the peak ratio, with that of the standard (Fig.1).

Table 2

S.No	Parameter	Tamsulosin HCl
1	Theoretical plate	4883.358
2	Tailing factor	1.126
3	SD	0.005
4	RSD Of 6 injection	0.7279

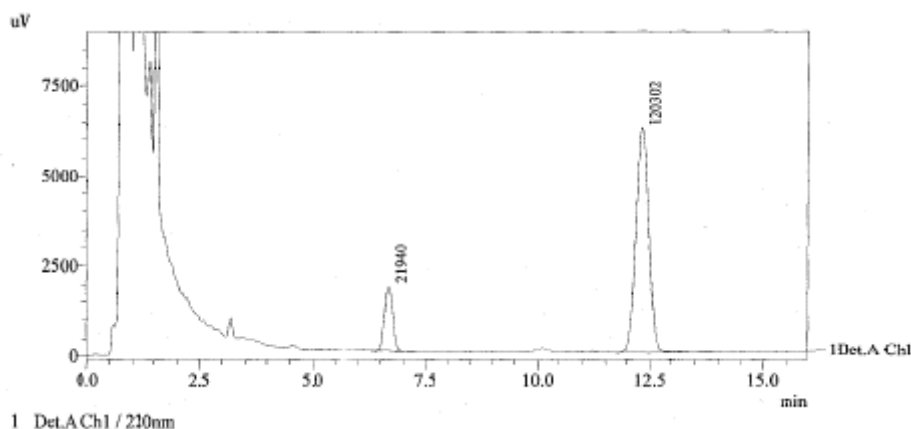


Fig. 1: Chromatogram of dissolution sample semi formulation containing Tamsulosin hydrochloride

Recovery studies

To study the linearity, accuracy and precision of proposed method, recovery experiments were carried out. Known quantities of standard at two different levels were added to the pre-analyzed sample, the recovery was estimated to be more than 99%.

RESULTS AND DISCUSSION

System suitability test is applied to a representative chromatogram to check various parameters such as efficiency, resolution and peak tailing. The results obtained are shown in Table II that is in concurrence with the USP requirements⁴.

Linearity

The linearity of Tamsulosin Hydrochloride is established by plotting a graph of peak area of standard solutions versus concentration. The linearity is found to be between 100-500µg/ml.

Chromatography

The mobile phase of acetonitrile and buffer in the ratio of 30:70 is found to be ideal for analysis of Tamsulosin Hydrochloride. The concentration of Tamsulosin Hydrochloride found to be within limits and the RSD values are reasonably low.

The precision of the method is studied by making 5 injections of standard and very low RSD values indicate good precision. The reproducibility and reliability of the method has been tested by performing recovery studies which showed good results.

CONCLUSION

The proposed method is very simple, rapid and now here involves use of complicated sample preparation. High percentage of recovery shows that the method is free from interferences of the excipients used in the semi formulations. therefore the method can be useful in routine quality control analysis.

REFERENCES

1. Min-Soo Kim^a, Jeong-Soo Kim^a, Yeon-Hee You^a, Hee Jun Park^a, Sibeum Lee^a, Jeong-Sook Park^a, Jong-Soo Woo^b and Sung-Joo Hwang, *International Journal of Pharmaceutics* **341**(1-2): 97-104 (2007).
2. Vítizslav Maier^a, Jana Horáková^a, Jan Petr^a, Eva Tesařová^b, Pavel Coufal^b and Juraj Ševčík, *Journal of Pharmaceutical and Biomedical Analysis* **39**(3-4): 691-696 (2005).
3. Sibel A. Özkan^a, Bengi Uslu^a and Hassan Y. Aboul-Enein, *Talanta* **61**(2): 147-156 (2003).
4. The united states pharmacopoeia, Us Pharmacopoeia convention Inc., Washington^{a, b} D.C., edition XXX.