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Method Development and Validation of Telmisartan in Bulk and Pharmaceutical Dosage Forms by UV Spectrophotometric Method

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Abstract

This research article describes the analytical method suitable for validation of Telmisartan by UV–spectro-photometric method. The method was utilized UV-Spectroscopy (Analytical, model-UV-2080).The proposed method is simple, fast, accurate, cost efficient and reproducible spectrophotometric method has been developed for the estimation of Telmisartan in pharmaceutical dosage formulation. The solvent system was consists of methanol: water in the ratio of 80:20 at wave length (λ_{max}) 230nm.The linearity for this drug at selected wave length is lies between 2-10 µg/ml. Beers law was obeyed in this concentration range with correlation co- efficient of 0.999. Accuracy was determined by recovery studies from tablet dosage forms and ranges from 99.48 to 100.26 %. Precision of method was finding out was repeatability, day to day and analyst to analyst variation and shows the values within acceptable limit (RSD ≤ 2 percentage).

Key words: Telmisartan, UV-Spectroscopy, Validation, HPLC

Contents

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1. Introduction

Telmisartan, 4-((2-n-propyl -4 - methyl-6-(1- methyl benzimidazol- 2- yl) - benzimidazol-1-yl) methyl) biphenyl -2 carboxylic acid (fig.1) is a novel, potent, highly selective non peptide Angiotensin type 1 (AT1) receptor blocker which is administered orally as Telmisartan, which is rapidly and completely hydrolyzed to Telmisartan, the active moiety during absorption from the gastrointestinal tract. Telmisartan has much greater affinity (>10,000 folds) for the AT1 receptor than for the AT2 receptor blockade of the rennin–angiotensin system with ACE inhibitors[8]; it does not bind to or block other hormone receptors or ion channels known to be important in cardiovascular regulation.

UV Spectrophotometric method[5] was developed and validated as per ICH guidelines. Literature survey revealed that there are many methods like HPTLC[1], RP-HPLC[2] and LC-MS/MS[3] for determination of Telmisartan. The simultaneous estimation method is also available for Telmisartan like HPLC[4] & LC. As the analysis is an important component in the formulation development of any drug molecule. Spectrometry is generally preferred especially by small scale industries as the cost of the equipment is less and the maintenance problems are minimal. The method of analysis is based on measuring the absorption of a monochromatic light by colorless compounds in the near ultraviolet path of spectrum[6] (200 380nm).

The API is subjected to a number of forces of degradation conditions to include acidic, basic, and oxidative conditions. Force of degradation should be one of the activities performed early in the development process to ensure that the method is discriminating before a lot of time, effort and money have been expended. Depending on the API, not every stress agent may effect degradation, but each agent has to be evaluated to determine whether degradation results[7].

Chemical Structure:

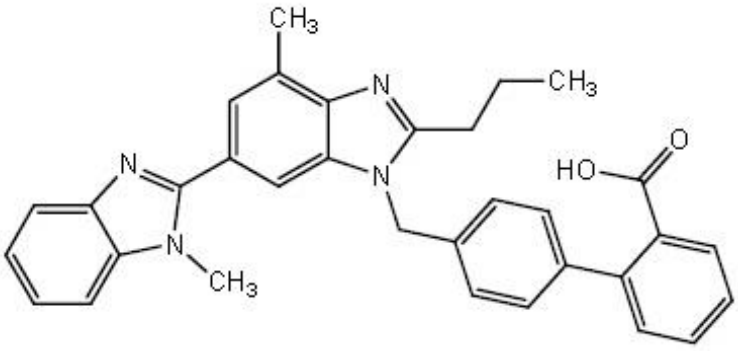

Figure.1 Chemical structure of Telmisartan

2. Materials and Methods

Reagents and chemicals:

Extra pure methanol procured from Merck (Mumbai) and distilled water prepared from the department of PA & QA.

Apparatus:

Digital balance, ultra sonicator, a double beam UV Visible spectrophotometer with resolution of 1nm & 0.5mm slit width and a pair of 1cm matched quartz cells was used to measure absorbance of the resulting solutions.

Marketed Formulation:

TELSAR* 20 (Unichem Laboratories Ltd. Baddi, India) was taken for study which contains Telmisartan-20mg.

Preparation of standard stock solution:

Standard drug solution of Telmisartan was prepared by dissolving 10mg of drug in 50ml mixture of methanol: water in the ratio of 80:20 respectively and transfers it to 100ml of volumetric flask and volume was made up to mark with above same mixture of methanol and water which make the solution of 100 microgram/ml concentration. For obtaining clear solution, solution was ultrasonicated.

Preparation of working standard solutions:

The prepared stock solution was further diluted with methanol: water (80:20) to get working standard solution of Telmisartan. The absorbance of each solution was measured at 230 nm against methanol: water (8:2) as blank. The standard graph for Telmisartan was plotted by taking concentration of drug on x-axis and absorbance y-axis.

Scanning and determination of maximum wavelength (λ_{max}):

In order to ascertain the wavelength of maximum absorbance (λ_{max}) of the pharmacodynamic agents solutions of particular concentrations of drugs 100 mg/ml and 10mg/ml in methanol: water (8:2) were scanned within the wavelength range of 200-400nm against a corresponding reagent blank. The resulting spectra were presented in fig 2.The absorption curves showed characteristic absorption maxima at 230nm for Telmisartan.

Preparation of sample solution:

The proposed method was applied to analyze commercially available Telmisartan tablet. Ten tablets were weighed and powdered the amount of tablet powder equivalent to 10mg of Telmisartan was weighed accurately and transferred to 100ml volumetric flask, then 50ml of mixture methanol and water(80:20) was added and kept for 15-20min with frequent shaking and volume was made up to mark with given solvent. The solution was filtered through whattman filter paper. This filtrate was diluted suitably with solvent to get the solution of 4 µg/ml concentration. The absorbance was measured against the blank solution. The drug content of the preparation was calculated using standard calibration curve. Amount of drug estimated by this method is given in table 3.

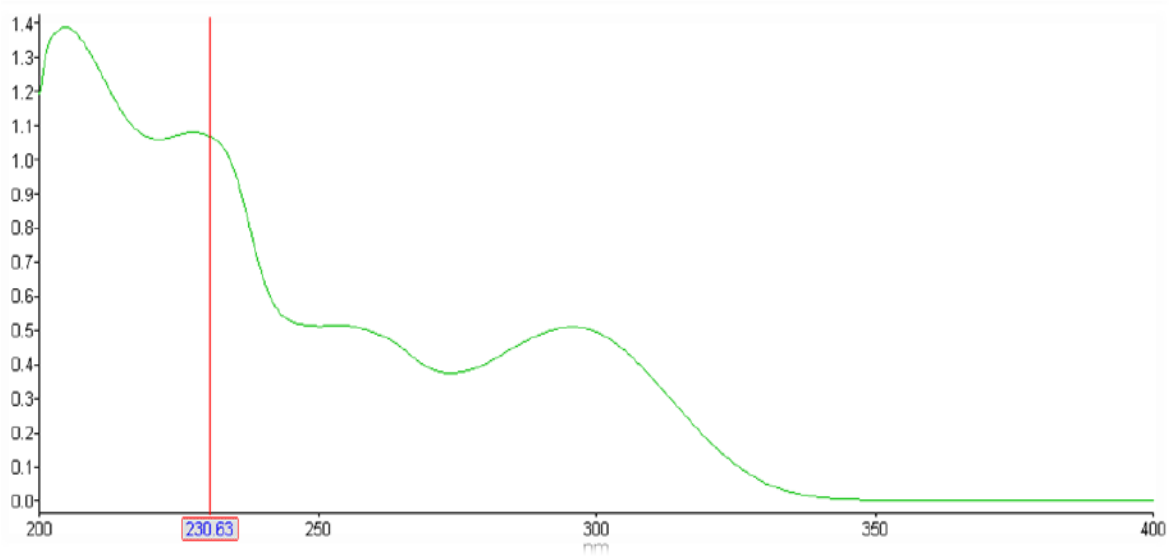

Figure.2 Determination of λ max of Telmisartan by UV scanning (Graph of absorbance vs wavelength)

3. Results and Resolution

Preparation calibration curve:

This calibration curve was plotted by taking concentration of drug on x-axis and absorbance on y-axis and was shown in fig 3 and the drug has obeyed Beer's law in the concentration range of 2-10 µg/ml, and it was found to be linear with R^2=0.999

Table.1 Calibration curve of Telmisartan

Concentration	Absorbance
0	0
2	0.204
4	0.415
6	0.629
8	0.821
10	0.994

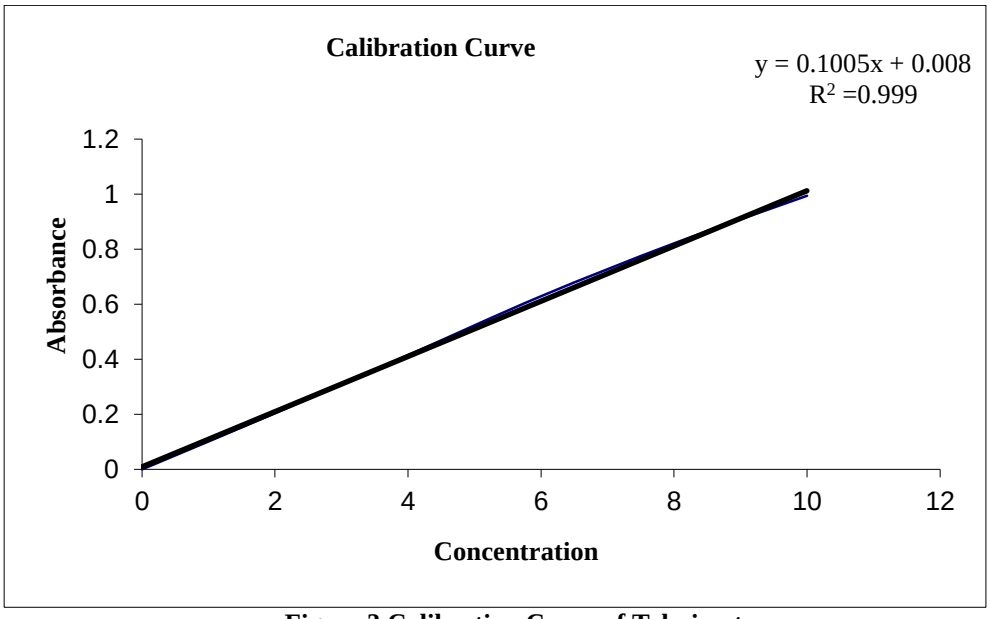

Figure.3 Calibration Curve of Telmisartan

Optical Characteristics of Telmisartan:

Table.2 Validation Parameters for Telmisartan

S.NO	Parameters	Results
1.	Absorption maxima (nm)	230nm
2.	Linearity range (µg/ml)	2 – 10
3.	Standard Regression Equation	y= 0.1005x + 0.008
4.	Correlation coefficient (r^2)	r^2 = 0.999
5.	Accuracy (% recovery ± SD)	99.04 ± 100.22
6.	Precision (%CV)	100.16%, 101.22%

Analysis of pharmaceutical formulations:

For analysis of commercial formulations, 2 tablets were weighed and powdered and powder equivalent to 10mg of Telmisartan were transferred in to 100ml volumetric flasks and dissolved in methanol: water (8:2) to get 100 µg /ml solutions. Then the solution was sonicated for 15min and filtered and further dilutions were made with methanol: water (8:2) to get the concentrations within the linearity range of respective drugs and measured the absorbance at 230nm for solution against methanol: water (8:2).Here 3ml was taken and made up to 10ml.The drug content in each tablet was estimated by using the standard graph.

Table.3 Analysis of Pharmaceutical Formulations

Formulation	Labelled Amount (mg)	Amount recovered	%drug recovered	Mean	Standard Deviation	% RSD
Telsar ®20	20 mg	19.9042	99.521	19.8940	0.176	0.885
Telsar ®20	20 mg	19.9230	99.615			
Telsar ®20	20 mg	19.8549	99.274			

Validation of the proposed method:

The proposed method was validated as per ICH guidelines[5] Q2 (B)

1. Accuracy (Recovery test):

Accuracy of the method was studied by recovery experiments. The recovery experiments were performed by known amounts of the drug in the placebo. The recovery was performed at three levels, 80,100 &120 % of Telmisartan standard concentration. The recovery samples were prepared in before mentioned procedure. Three samples were prepared for each recovery level. The solutions were then analyzed, and the percentage recoveries were calculated from the calibration curve. The recovery values for Telmisartan ranged from 99.04 to 100.22% (Table 4)

Table.4 Determination of Accuracy by % recovery method

No. of Preparations					Statistical Analysis	
	Formulation	Pure Drug	% recovery	Mean	S.D	% R.S.D
S_1 : 80 %	20	16	99.78	99.80	0.2458	0.2463
S_2 : 80 %	20	16	99.57			
S_3 : 80 %	20	16	100.06			
S_4 : 100 %	20	20	100.15	100.12	0.1571	0.1571
S_5 : 100 %	20	20	99.95			
S_6 : 100 %	20	20	100.26			
S_7 : 120 %	20	24	99.48	99.34	0.5632	0.5669
S_8 : 120 %	20	24	98.72			
S_9 : 120 %	20	24	99.82			

2. Precision:

Assay of method precision (intra-day precision) was evaluated by carrying out six independent assays of test samples of Telmisartan. The intermediate precision (inter day precision) of the method was also evaluated using two different analysis and different days in the same laboratory. The relative standard deviation (RSD) and assay values obtained by two analysts were 0.509, 100.16% and 0.566, 101.22% respectively (Table 5).

Table.5 Precision: (Intra Day and inter day)

Sample	Assay of Telmisartan as percentage of labeled amount	
	Analysis of Intra Day Precision	**Analysis of Inter Day Precision**
1	100.26	101.20
2	99.78	100.12
3	99.57	101.42
4	100.32	101.28
5	101.03	101.59
6	100.02	101.71
Mean	100.16	101.22
S.D	0.510	0.571
R.S.D	0.509	0.564

3. Linearity:

The linearity of the response of the drug was obtained at 1 to 8 /ml concentrations. The calibration curve was obtained by plotting the absorbance versa the concentration data and was treated by linear regression analysis (Table 6).The equation of the calibration curve for Telmisartan obtained was y=0.1005x-0.008, the calibration curve was found to be linear in the aforementioned concentrations(The correlation coefficient(r^2) of determination was 0.999).

Table.6 Linearity Data

Conc. µg/ml	Absorbance
0	0
2	0.204
4	0.415
6	0.629
8	0.821
10	0.994

4. Ruggedness:

To determine the ruggedness the same procedure was carried by another analyst and the results was compared with the same previous procedure and the results were shown in Table 7.

Ruggedness data at 10 µg/ml by two analysts at different days:

Table.7 Ruggedness Data

Test conc. (µg/ml)	Analyst I	Analyst II
10	0.9505	0.9515
10	0.9479	0.9495
10	0.9515	0.9499
10	0.9499	0.9512
10	0.9510	0.9502
Mean	0.9502	0.9505
S.D	0.0014	0.0008
% R.S.D	0.1473	0.0841

4. Conclusion

The proposed method is simple, sensitive and reliable with good precision and accuracy and also method is specific while estimating the commercial formulation without interference of excipients and other additives. Hence, this method can be used for routine determination of Telmisartan in bulk sample and pharmaceutical formulation. The proposed UV Spectrophotometric method is evaluated over the linearity, accuracy, precision, ruggedness and proved to be convenient and effective for the quality control of Telmisartan.

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6. References

1. Chitra P, Ganesa SS, Arumugam K, Suvarna K, Mallayasamy SR, Determination of telmisartan by HPTLC-A stability indicating assay, Indian Journal of Pharmaceutical science, 20, 2007, 477-481.
2. MS Palled, P MN Rajesh, M Chatter, AR Bhat, RP-HPLC determination of Telmisartan in tablet dosage forms, Indian Journal of Pharmaceutical science, 67, 2005, 108-110.
3. Pengfei L, Yingwu W, Yan W, Yunbiao T, Fawcett JP, Determination of telmisartan inhuman plasma by liquid chromatography–tandem mass spectrometry, Journal of Chromatography B, 828, 2005,126-129.
4. Rane VP, Sangshetti, JN, Shinde, DB, Simultaneous High-Performance Liquid Chromatographic Determination of Telmisartan and Hydrochlorothiazide in Pharmaceutical Preparation, Journal of Chromatographic Science, 46, 2008, 887-891.
5. Validation of Analytical Procedures: Methodology (Q2B) Harmonized Tripartite Guidelines. JK singh, Analytical Chemistry, 3rd Edn, pharmaceutical press, 2009,210.
6. Matthews, Regulatory Aspects of Stability Testing in Europe, In Carstensen T, editors, Marel Dekker Inc,:2008, 732.
7. KD. Tripathi, Essentials of Medical Pharmacology, 6th Edition. Editors Jaypee Brothers Medical Publishers: 2008,852.