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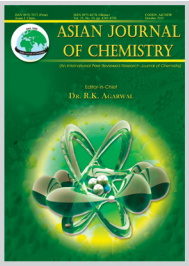

NOTE

Visible Spectrophotometric Determination of Olmesartan Medoxomil in Pharmaceutical Formulations

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Two simple and sensitive spectrophotometric methods (method **A** and method **B**) in the visible region have been developed for determination of olmesartan medoxomil in bulk and in pharmaceutical formulations. Method **A** is based on oxidative coupling of olmesartan medoxomil with 3-methylbenzothiazolin-2-one hydrazone (MBTH). The resulting green complex has λ_{max} at 631 nm. Method **B** is based on the reduction of ferric to ferrous ions followed by complexation with 1,10-phenanthroline to produce an orange red chromogen at λ_{max} 510 nm. Beers law is obeyed in the concentration range of 10-45 µg/mL and 5-35 µg/mL respectively. These methods were extended to pharmaceutical formulations and there was no interference from excepients and diluents. The proposed methods are simple, sensitive, accurate and suitable for quality control applications.

Key Words: Olmesartan medoxomil, 3-Methylbenzothiazolin-2-one hydrazone, 1,10-Phenanthroline.

Olmesartan medoxomil (OLM) is described chemically as the (5-methyl-2-oxo-1,3-dioxol-4-yl) methyl ester of 4-(1-hydroxy-1-methylethyl)-2-propyl-1-{[2'-(1*H*-Tetrazol-5-yl)-[1,1'-biphenyl]-4-yl]methyl}-1*H*-imidazole-5-carboxylic acid[1]. Olmesartan medoxomil blocks vasoconstrictor effect of angiotensin II by selectively blocking the binding of angiotensin II to the AT I receptor in vascular muscle. A review of literature reveals that several methods were reported for estimation of Olmesartan medoxomil using HPLC-MS[2-4], HPLC[5-11], UV spectrophotometric[12] methods. Sena Caglar *et al.*[13] developed a visible spectrophotometric method based on the formation of ion associates in the reactions between Olmesartan medoxomil and ion-pair agents (bromocresol green and bromophenol blue). The idea of the present work was to produce simple, sensitive, rapid extraction free and cost effective, spectrophotometric determination of olmesartan medoxomil and the methods are free from interference when excipients are present.

The methods are based on (i) the oxidative coupling reaction of the drug with 3-methylbenzo[*d*]thiazolin-2-one hydrazone (MBTH) in the presence of ferric chloride in a neutral medium and (ii) reduction of ferric to ferrous ions followed by complexation with 1,10- phenanthroline.

A Jasco UV-VIS Spectrophotometer 630 with 1.0 cm matched quartz cells was used for absorbance measurements. All the chemicals used were of analytical grade. All the solutions were freshly prepared in deionized water.

Method A: (a) 0.5 % MBTH solution (b) 1 % ferric chloride solution.

Method B: (a) 0.5 % 1,10-Phenanthroline solution (b) 0.5 % Ferric chloride solution.

Preparation of standard and sample solution: Accurately weighed 10 mg of olmesartan medoxomil was transferred to 100 mL volumetric flask. 10 mL of methanol was added and shaken to dissolve the drug. The volume was made up to 100 mL with deionized water to prepare a stock solution of 100 µg/mL. Working standard solution of Olmesartan medoxomil containing 10-45 µg/mL for method A (MBTH) and 5-35 µg/mL for method B (1,10-phenanthroline) were prepared by further dilutions. A 0.5 % aqueous solution of MBTH and 0.5 % aqueous solution of 1, 10-phenanthroline were prepared freshly. 1 % (Method A) and 0.5 % (Method B) of ferric chloride was prepared freshly.

Method A: Aliquots of the working standard solution (10-45 µg/mL) of Olmesartan medoxomil (1.0 mL = 100 µg/mL) were transferred into a series of 10 mL calibrated flasks. To each, 1.5 mL of freshly prepared $FeCl_3$ (1 %) and 1 mL of MBTH (0.5 %) were added. The solutions were swirled and allowed to stand for 5 min and made up to the mark with deionized water. After mixing the solutions, thoroughly, the absorbance was measured at 631 nm against the corresponding reagent blank and the amount of Olmesartan medoxomil present in the sample solution was computed from its calibration curve.

TABLE-3
ACCURACY OF THE METHOD (RECOVERY STUDIES)

Name of the formulation	Method A (OLM + MBTH)			Method B (OLM + 1,10-phenanthroline)		
	Pre-analyzed amount (mg)	Amount added (mg)	Amount found (%) Mean* ± S.D.	Pre-analyzed amount (mg)	Amount added (mg)	Amount found (%) Mean* ± S.D.
Olmetor	20	16	100.52 ± 0.33	20	16	100.17± 0.20
	20	20		20	20	
	20	24		20	24	
Olmezest	20	16	100.31 ± 0.19	20	16	100.11 ± 0.40
	20	20		20	20	
	20	24		20	24	

*Mean of five determinations

Method B: Aliquots of the working standard solution (5-35 µg/mL) of Olmesartan medoxomil (1.0 mL = 100 µg/mL) were transferred into series of 10 mL calibration flasks. To each 1.5 mL of ferric chloride (0.5 %) and 1 mL of 1,10-phenanthroline (0.5 %) were added. The flasks were heated on water bath for 15 min at 60 ºC, cooled to room temperature and the total volume was made up to 10 mL with deionized water. The absorbance of blood red coloured species was measured at 510 nm against reagent blank. The amount of Olmesartan medoxomil present in the sample solution was computed from its calibration curve.

Analysis of dosage forms: Weighed an amount of the sample equivalent to about 10 mg of Olmesartan medoxomil and was dissolved in 10 mL of methanol. The solution was shaken and filtered through Whatman No. 1 filter paper and washed with water and made up to 100 mL suitable aliquots of the sample solution were analyzed by applying general procedure with no modification and the results are shown in Table-2.

TABLE-1
ANALYTICAL PARAMETERS OF SPECTRO-PHOTOMETRIC METHODS

Parameters	Method A	Method B
λ_{max} (nm)	631	510
Beer's law limits (µgmL^{-1})	10- 45	5-35
Molar absorptivity (L mol^{-1}cm^{-1})	6048×10^4	4055×10^4
Sandell's sensitivity (µgmL^{-1})	0.0924	0.1377
Regression equation**(Y = mX + c)		
Slope (m)	0.0078	0.0039
Intercept (c)	0.0894	0.0676
Correlation coefficient (r^2)	0.9995	0.9994
Limit of detection (µgmL^{-1})	0.52	0.22
Limit of quantification (µgmL^{-1})	1.72	0.73
Stability (h)	2	4
Colour	Green	Red

**Y = mX + c, where Y is the absorbance and X is the concentration of drug in µgmL-^{1}; Mean of six determinations

TABLE-2
DETERMINATION OF OLM IN PHARMACEUTICAL FORMULATIONS

Tablet brand name	Labelled amount (mg)	Amount of drug found (%) Mean* ± S.D.	
		Method A (OLM + MBTH)	Method B (OLM + 1,10-phenanthroline)
Olmetor	20	99.89 ± 0.26	99.82 ± 0.26
Olmezest	20	100.29 ± 0.16	100.33 ± 0.18

*Mean of five determinations

In method **A**, the drug was allowed to react with MBTH in the presence of ferric chloride in neutral medium and a green coloured complex that are absorbed at (λ_{max}) 631 nm. This is an iron-catalyzed, oxidative coupling reaction of MBTH with the drug. Under the oxidative reaction conditions, MBTH loses two electrons and one proton, forming an electrophilic intermediate that is the active coupling species. This intermediate undergoes electrophilic substitution with the drug to form the coloured product. Method B, is based on formation of red coloured chromogen, due to unshared pair of electrons on each of the two nitrogen atoms of 1,10-phenanthroline complexes with Fe^{2+} formed by the reaction with Olmesartan medoxomil and Fe^{3+}.

The optical characterstics such as absorption maxima, Beer's law limit, Molar absorptivity, Sandell's sensitivity for these methods are presented in Table -1. The regression analysis using the method of least squares was made for slope (a) and intercept (b) obtained from different concentrations are summarized in Table-1. Commercial formulation of Olmesartan medoxomil were analyzed by the proposed methods. The values obtained by the proposed methods are presented in Table-2. To evaluate validity and reproducibility of the methods, a fixed amount of pure drug was added to the pre-analyzed formulation. The results are summarized in Table-3. There is no interference in the proposed analytical methods.

REFERENCES

1. D. Norwood, E. Branch, B. Smith and M. Honeywell, *Drug Forecast*, **27**, 611 (2002).
2. V.V. Vaidya, M. Shikha, N. Roy, S.M. Yetal, S.S. Joshi and S.A. Parekh *Chromatographia,* **67**, 147 (2008).
3. S.H. Chen, C.F. Wu, B.M. Chen, Q. Pei, H.Y. Tan, L. Yang, G.P. Yang and N. Fang, *J. Southern Med. Univ.*, **28**, 60 (2008).
4. D. Liu, P. Hu, N. Matsushima, X. Li, L. Li and J. Jiang, *J. Chromatogr. B.*, **856**, 190 (2007).
5. S.W. Weng, *Yaowu Fenxi Zahi*, **26**, 686 (2006).
6. T. Murakami, H. Konno, N. Fukutsu, M. Onodera, T. Kawasaki and F. Kusu, *J. Pharm. Biomed. Anal.*, **47**, 553 (2008).
7. V.P. Rane, K.R. Patil, J.N. Sangshetti, R.D. Yeole and D.B. Shinde, *Chromatographia*, **69**, 169 (2009).
8. L. Bajerski, R.C. Rossi, C.L. Dias, A.M. Bergold and P.E. Froehlich, *Chromatographia*, **68**, 991 (2008).
9. P. Trivedi, C. Kartikeyan, R. Kachave and R. Bhadane, *J. Liq. Chromatogr. Rel. Technol.*, **10**, 1516 (2009).
10. C.V. Patel, A.P. Khandhar, A.D. Captain and K.T. Patel, *Eur. J. Anal. Chem.*, **2**, 159 (2007).
11. R.B. Ganduri, R.A. Lanka, S. Pamidi, J.R. Peddareddigari and M. Mohammed, *Eur. J. Anal. Chem.*, **5**, 145 (2010).
12. M. Celebier and S. Altinoz, *Pharmazie*, **62**, 419 (2007).
13. S. Caglar and A. Onal, *J. Anal. Chem.*, **65**, 239 (2010).