

INTERNATIONAL JOURNAL OF INSTITUTIONAL PHARMACY AND LIFE SCIENCES

Pharmaceutical Sciences

Research Article.....!!!

Received: 06-11-2011; Accepted: 10-11-2011

SIMULTANEOUS QUANTIFICATION OF VOGLIBOSE AND METFORMIN BY VALIDATED ANALYTICAL METHOD IN TABLET DOSAGE FORM

N. Raj, R. Nargund, P. Kabra*, R. Kimbahune, A. Patel, L.V.G. Nargund

Nargund College of Pharmacy, Dattatreyanager, II nd Main, 100 ft. Ring Road, BSK III Stage,
Bangalore- 560 085, Karnataka, India

ABSTRACT

Keywords:

Voglibose, Metformin,
Multi component
spectroscopy

For Correspondence:

P. Kabra

Nargund College of
Pharmacy, Dattatreyanager,
II nd Main, 100 ft. Ring
Road, BSK III Stage,
Bangalore- 560 085,
Karnataka, India

E-mail:

prachi.v.kabra@gmail.com

A simple, accurate, economical and reproducible UV spectrophotometric method for simultaneous estimation of Voglibose and Metformin in combined tablet dosage form has been developed. The developed method employs multi component spectroscopy using 325nm, 285nm, 245nm and 205nm as wavelengths for estimation. Results of analysis were validated statistically in accordance with ICH guidelines.

INTRODUCTION:

Voglibose (VOG) [5-(1,3-dihydroxypropan-2-ylamino)-1-(hydroxymethyl)cyclohexane-1,2,3,4-tetrol], an α -glucosidase inhibitor, is prescribed for lowering post-prandial blood glucose levels in people with diabetes mellitus. It delays the absorption of glucose at the intestine level thereby prevent sudden surge of glucose after a meal and also reduces the risk of macrovascular complications. It is also indicated for the management of postprandial hyperglycemia (PPHG) which is primarily due to first phase insulin secretion.

Chemically Metformin (MET) is 3-(diaminomethylidene)-1, 1-dimethylguanidine, an oral anti-diabetic drug, used for the treatment of type 2 diabetes, particularly in overweight and obese people; also used in the treatment of polycystic ovary syndrome and has been investigated for other diseases where insulin resistance may be an important factor.

Potentiometry, spectrofluorimetry, UV-Visible spectrophotometry [1] and stability indicating capillary electrophoresis[2] methods for estimation of MET and spectrofluorimetry[3], UV-Visible spectrophotometry methods for estimation of VOG[4] have been reported. Many analytical methods like RPHPLC[5], supercritical fluid chromatography/tandem mass spectrometry, capillaryzone electrophoresis were available for estimation of MET individually or in combination with glicaside[6], pioglitazone[7,8], glimepiride[8], repaglinide[9], rosiglitazone[10] and its related compound (1-Cyanoguanidine)[11] are available in the literature. As there is no analytical method reported for quantitative estimation of VOG and MET in combination, the present study was aimed at the simultaneous estimation of Voglibose and Metformin by using multi component mode of analysis without prior separation in pharmaceutical dosage form.

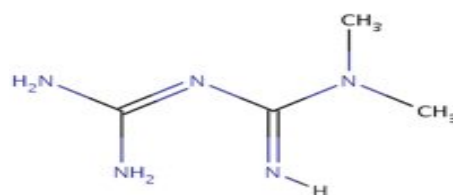
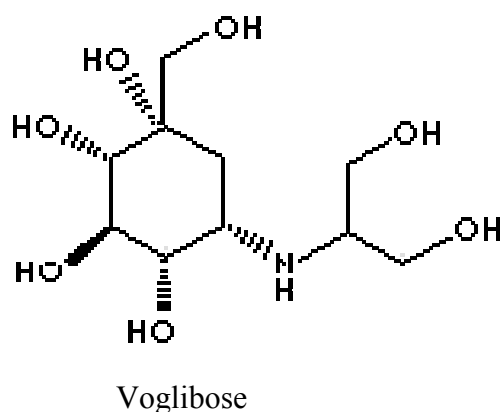


Fig 1: Structures of Voglibose and Metformin

MATERIALS AND METHODS:

Reagents and Materials:

Voglibose and Metformin in the form of gift samples were kindly supplied by BioPlus Life Sciences, Micro Labs Ltd, Bangalore respectively. Double distilled water was used as solvent throughout the study. A combination of Voglibose (0.2 mg) and Metformin (500 mg) in tablet formulation was procured from local pharmacy (Zuvog-M 0.2, Zuventus Healthcare Ltd.).

Instrument:

A Shimadzu UV/Visible double beam spectrophotometer (Model 1700) with 1cm matched quartz cells was used in present study for multi component analysis.

Method:

Five mixed standards of two drugs were prepared so as to contain 2-10 $\mu\text{g/ml}$ of MET and 0.0008-0.0040 $\mu\text{g/ml}$ of VOG in double distilled water. All mixed standard solutions were scanned over the range of 325nm to 190nm in multi component mode of spectrophotometer at medium scanning speed where measuring wavelength interval of 40nm was selected. An overlain spectrum of mixed standard solutions is as shown in (Fig 2). The spectral data of these scans were stored in the instrument and used to determine the concentration of two drugs in the solution.

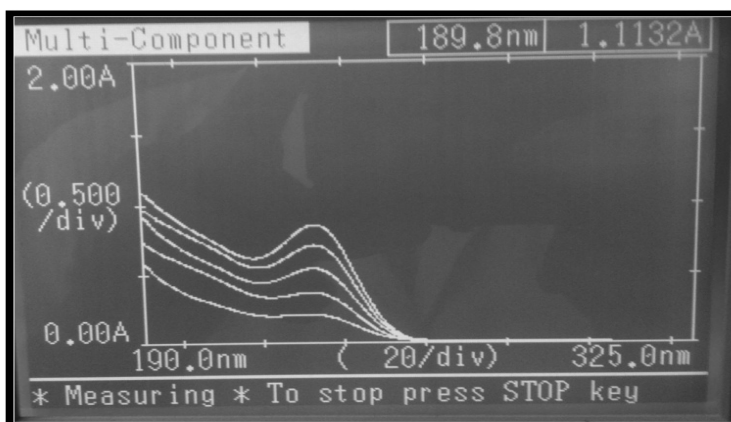


Fig 2: Overlain spectra of mixed standards of Voglibose and Metformin

Analysis of commercial formulation

Twenty tablets were accurately weighed and crushed to fine powder. The tablet powder equivalent to 100mg of MET was accurately weighed, transferred to 100ml volumetric flask, dissolved in small quantity of double distilled water and finally make up to mark with double distilled water. This solution was filtered through whattman filter paper No. 41. The filtrate was further diluted with double distilled water to get concentration of 6 $\mu\text{g/ml}$ of MET.

The sample solution was scanned over the range of 325nm to 190nm in multi component mode and concentration of each component was estimated by analysis of spectral data of sample solution with respect to that of mixed standards by the instrument. The spectrum of sample solution is given in (Fig 3).

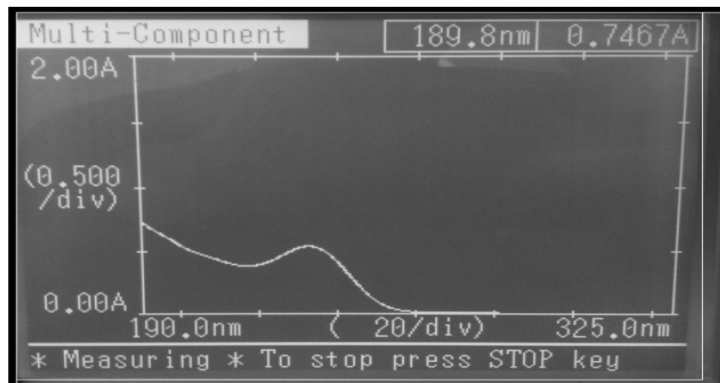


Fig 3: Spectrum of sample solution

Table 1: Assay of marketed formulation (Zuvog-M tablets)

Analyte	Label claim per tablet (mg)	Mean Amount found in tablet (mg)	Mean Amount Found (%)	R.S.D. (%) n=6
VOG	0.2	0.196	98.00%	2.182
MET	500	500.59	100.12%	1.593

Validation of method

Developed analytical method has been validated in accordance with ICH guidelines (Q2A). Recovery studies were carried out by addition of pure drug to previously analyzed tablet sample at three different concentration levels (80%, 100% and 120%). The results of recovery studies are reported in (Table-2). While precision of the method was determined by repeatability (intra-day) and intermediate precision (inter-day) and expressed as relative standard deviation (RSD). Intra-day precision was evaluated by analyzing concentration of VOG (0.0024 μ g/ml) and MET (6 μ g/ml) of standard and sample solutions at three different time intervals under the same experimental conditions on the same day. Intermediate precision (inter-day precision) was determined by analyzing above mentioned concentrations of solutions on three consecutive days. (Table 3)

Table 2: Recovery Studies

Analyte	LEVEL OF RECOVERY		
	80% (\pm RSD)	100% (\pm RSD)	120% (\pm RSD)
VOG	95.46 \pm 1.36	101.25 \pm 1.19	95.83% \pm 1.12
MET	97.77 \pm 0.31	99.99 \pm 0.54	100.37% \pm 0.65

Table 3: Results of Precision Studies (Intra-day and Inter-day)

Analyte	Concentrations Of sample solution (μ g/ml)	Intra-day precision % RSD (n=3)	Inter-day precision % RSD (n=3)
VOG	0.0024	0.01	2.02
MET	6	0.94	0.6

RESULTS AND DISCUSSION:

Considering the common solubility of drugs, the stock solution was prepared in water while further dilutions were made in different solvents like methanol and glacial acetic acid. Results obtained were found to be satisfactory in water. Hence water was used as solvent.

As the proposed method is specific to instrument having software for provision of such determination, selection of proper sampling wavelength and concentration of mixed standard are critical. Hence overlay spectra of analytes were studied carefully. Voglibose was found to be absorbing prominently at 190nm with smaller peak in the range of 325nm to 245nm while Metformin absorbed at 232nm (λ_{max}) and scanning range of 325nm to 190nm was selected for the multicomponent analysis.

The content of analytes in the marketed formulation were found in the range of 98-100.12% while recovery was found in the range of 95.5-101.3%. The values of relative standard deviations of inter –intraday studies were found to be less than 2%. The assay and validation results confirmed that the contents of VOG and MET estimated in the tablet dosage form were free from the interference of excipients.

CONCLUSION:

Hence it can be concluded that the developed multi component spectroscopy method for simultaneous estimation of Voglibose and Metformin in combined tablet dosage form is simple, economical, accurate and reproducible and will be conveniently adopted for the routine quality control analysis from its pharmaceutical formulations and bulk drug.

REFERENCES:

1. Saad SMH, Mahmoud WH, Elmosallamy MAF and Othman AHM. Determination of metformin in pharmaceutical preparation using potentiometry, spectrofluorimetry and UV-Visible spectrophotometry. *Anal chim Acta* 1999 Jan; 378(1-3): 299-311.
2. Hamdan II, Bani AKJ and Abushoffa AM. Development and validation of a stability indicating capillary electrophoresis method for the determination of metformin hydrochloride in tablets. *J pharm biomed anal* 2010; 53(5): 1254-57.
3. Rao NM, Bagyalakshmi J, Ravi TK. Development and validation of spectrofluorimetric method for the estimation of voglibose in bulk and pharmaceutical dosage form. *Int J Pharm Sci Res* 2010 May; 1(6): 95-102.
4. Rao NM, Bagyalakshmi J, Ravi TK. Development and validation of UV spectroscopic method for estimation of voglibose in bulk and tablets. *J Chem Pharm Res* 2010 May; 2(2): 350-56.
5. Wanjari MM, There AW, Tajne MR, Chopde CT and Umathe SN. Rapid and simple RPHPLC method for the estimation of metformin in rat plasma. *Indian J Pharm Sci* 2008 Mar-Apr; 70(2): 198-203.
6. Agarawal YK, Gogoi PJ, Manna K, Bhatt HG, Jain VK. A supercritical fluid chromatography/tandem mass spectrometry method for the simultaneous quantification of metformin and glicaside in human plasma. *Indian J pharm sci* 2010; 72: 50-7.
7. Sahoo PK, Sharma R and Chaturvedi SC. Simultaneous estimation of metformin hydrochloride and pioglitazone hydrochloride by RPHPLC method from combined tablet dosage form. *Indian J Pharm Sci.* 2008 May-June; 70(3): 383-86.
8. Jain D, Jain S, Jain D, Maulik A. Estimation of metformin hydrochloride, pioglitazone hydrochloride and glimepiride by RP-HPLC in tablet formulation. *J Chromatogr Sci* 2008 July; 46(6): 501-04(4).
9. Patel JR, Suhagia BN, Patel BH. Simultaneous spectroscopic estimation of metformin and repaglinide in a synthetic mixture. *Indian J Pharm Sci* 2007; 69: 844-46.
10. Yardimci C and Ozaltin N. Method development and validation of the simultaneous determination of rosiglitazone and metformin in pharmaceutical by capillaryzone electrophoresis. *Anal chim Acta* 2005 Sep; 549(1-2): 88-95.
11. Rimawi FAI. Development and validation of an analytical method for metformin hydrochloride and its related compound (1-Cyanoguanidine) in tablet formulation by HPLC-UV. *Talanta* 2009; 79(5): 1368-71.
12. Kar M and Choudhry PK. HPLC method for estimation of metformin hydrochloride in formulated microspheres and tablet dosage form. *Indian J Pharm Sci* 2009 May-June; 71(3): 318-20.