UV- Visible Spectrophotometric Estimation of Olmesartan in Pharmaceutical Dosage Form

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Abstract:
A simple spectrophotometric method based on single wavelength spectroscopy has been developed for the olmesartan in different pharmaceutical dosage forms. The method is based on the simple solubility of olmesartan in methanol. The absorbance maximum of Olmesartan was measured at wave length 271nm and 731nm for the UV method and visible method. Both the methods obeyed Beer-Lambert's law over the concentration range 1-10 µg/ml and 0.5-3 µg/ml. The proposed method was successfully applied to the determination of Olmesartan in pharmaceutical dosage forms and the results tallied well with the label claim.

Keywords: Olmesartan, UV spectrophotometer, Folin-Ciocalteus reagent (FC reagent), Olsertan, Olmetrack, Olmezest

1.oIntroduction:

Olmesartan medoxomil, a prodrug, is hydrolyzed to olmesartan during absorption from the gastrointestinal tract. Olmesartan is a selective AT1 subtype angiotensin II receptor antagonist.Olmesartan medoxomil is an angiotensin II receptor blocker (ARB) approved for the treatment of high blood pressure, alone or with other antihypertensive agents, and is one of eight marketed ARB drugs. Olmesartan is a medicine which is used in hypertension. Its chemical name is 3-dihydroxy-2-butenyl 4(1-hydroxy-1-methylethyl)-2-propyl-1-[p-(o-1H-tetrazol-5-ylphenyl)benzyl]imidazole5-carboxylate, cyclic 2,3-carbonate and has an empirical formula of $C_{29}H_{30}N_6O_6$ and a molecular weight of 558.585 g/mol. The structural formula is:

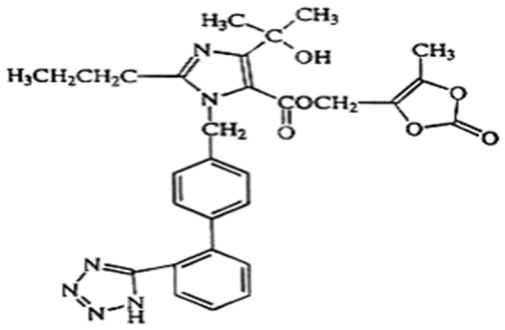

Figure 1: Structure of Olmesartan

2.0 Materials and Methods

2.1Instrumentation

Techcomp UV-2301 double beam UV-Visible spectrophotometer was used to carry out spectral analysis and the data was recorded by Hitachi software. Standard cuvettes of 10mm path length are used for analysis. Sonicator (1.5L) Ultrasonicator was used for sonicating the standard and formulation sample. Standard and sample drugs were weighed by using Denver electronic analytical balance (SI-234).

2.2Reagents, Standard and samples:

Working standard sample Olmesartan was obtained from well reputed research laboratory, formulation sample was purchased from local pharmacy. Spectrophotometric coloring reagent i.e Folin-Ciocalteu reagent (FC reagent) was purchased from Merk chemicals pvt limited, Mumbai, India.

2.3 Preparation of standard stock solution:

Standard stock solution of Olmesartan pure drug was prepared by accurately weighing about 10mg of each drug in 10ml volumetric flask. The drugs were dissolved with 5ml of methanol, and sonicated to dissolve it completely and made up to the mark with the same solvent; results 1000µg/ml solution was obtained. From this 1ml was taken and diluted to 10ml to get a concentration of 100µg/ml. from 100µg/ml solution 2ml was taken and make up to 20ml to get a final working stock solution of 10µg/ml. required concentrations or dilutions needed uv and visible estimation was prepared from 10µg/ml solution.

2.4 Preparation of Formulation Sample:

10 tablets from each of the brand selected for assay estimation of Olmesartan was grinded to get a fine powder and homogenously mixed using a mortar and pestle. From the powder, an amount of the powder equivalent to 10mg of Olmesartan was weighed and was dissolved in 10ml of Methanol. The solution was sonicated for 10min to complete extraction of drugs in Methanol. The solution was centrifuged at 4000 rpm for 10 min; the clear supernatant was collected and was filtered through whatmann filter paper. From this solution selected concentration was prepared by proper dilution. Similar procedure was fallowed for the preparation of remaining branded tablets separately. The prepared solutions were used for the assay of Olmesartan.

3.0 UV Spectrophotometric estimation:

3.1 Selection of solvent for solubility:

The drug Olmesartan was practically insoluble in water. Hence water was not used for the preparation of drug solutions. We prepared different soluble solvents of Olmesartan like methanol, Acetonitrile etc in a fixed dilute solution and absorbance of solution was measured. Finally when solvent Methanol and dilutions with water were used it showed improved absorbance compared to other solvents. Hence standard drug was soluble in methanol and necessary required dilutions were prepared with water as diluents for spectrophotometric estimation.

3.2 Selection of wavelength maxima:

Suitable maximum absorbance for the estimation of Olmesartan was identified by scanning the absorbance in spectrum mode within the wavelength region of 400-200nm in three different dilute solutions. In all the solutions the drug absorbed maximum wavelength at 271nm. Hence 271nm was found to be suitable wavelength for the estimation of Olmesartan.

3.3 Construction of calibration curve:
From the prepared standard stock solution, a series of calibration standards were prepared by selected dilutions. From the stock solution, 1µg/ml, 2, 3, 4, 5, 6, 7, 8, 9, 10µg/ml was prepared. The absorbance of the prepared solutions was measured at 271nm against a regent blank. At each concentration a triplet readings were measured and mean value was used for the Construction of calibration curve. Calibration curve was constructed by taking concentration of the prepared solution on x-axis and corresponding absorbance on y-axis.

3.4 Formulation analysis:
The absorbance of the prepared formulation solution in all the brands was measured at 271nm in triplets separately. The average absorbance value was used for the formulation estimation of Olmesartan. The % assay was estimated in the prepared sample solutions by substituting the absorbance values in the regression equation.

4.0Visible Spectrophotometric estimation:
4.1Preparation of Reagents:
FC Reagent: 10ml of FC Reagent in 100ml distill water.
Na_2CO_3 (15%): 15gms of Na_2CO_3 in 100ml distill water.

4.2 Method procedure:
Aliquot of the drug (0.5-3.5ml) was then in a series of 10ml volumetric flasks, 1.5ml of FC reagent solution and 1.0ml of Na_2CO_3 solution was added. Then the contents were incubated for 10min with occasional shaking. Final volume of the volumetric flask was madeup to 10ml with double distilled water. The solutions attain dark Blue color while the blank solution showed very light Blue color. Then the absorbance of the formed color was measured at 731nm against a reagent blank.

4.3 Formulation Assay:
From the prepared 10µg/ml of the sample solution, 1ml was taken and procedure described above was applied. After the development of the color, the absorbance of the separated chloroform layer was measured at 731nm against a similar reagent blank. The resultant absorbance values were used for the estimation of Olmesartan in the formulation assay. The % assay was estimated in the prepared sample solutions by substituting the absorbance values in the regression equation

5.0Results and Discussion:
Olmesartan showed maximum absorbance at 271 nm and 731nm for UV method and visible method. Based on the experimental data the standard calibration curve was plotted (Fig.5.2) The absorbance range was found to be 1-10 µg/ml for UV method and 0.5-3.0 µg/ml for the FC method. As these solutions obeyed Beer-Lambert's law and the content of drug was calculated from the equation y = 0.050x - 0.066 with correlation coefficient of 0.9989 and y = 0.042x - 0.057 with correlation coefficient of 0.998.Wavelength scanning result was shown in figure 5.1.

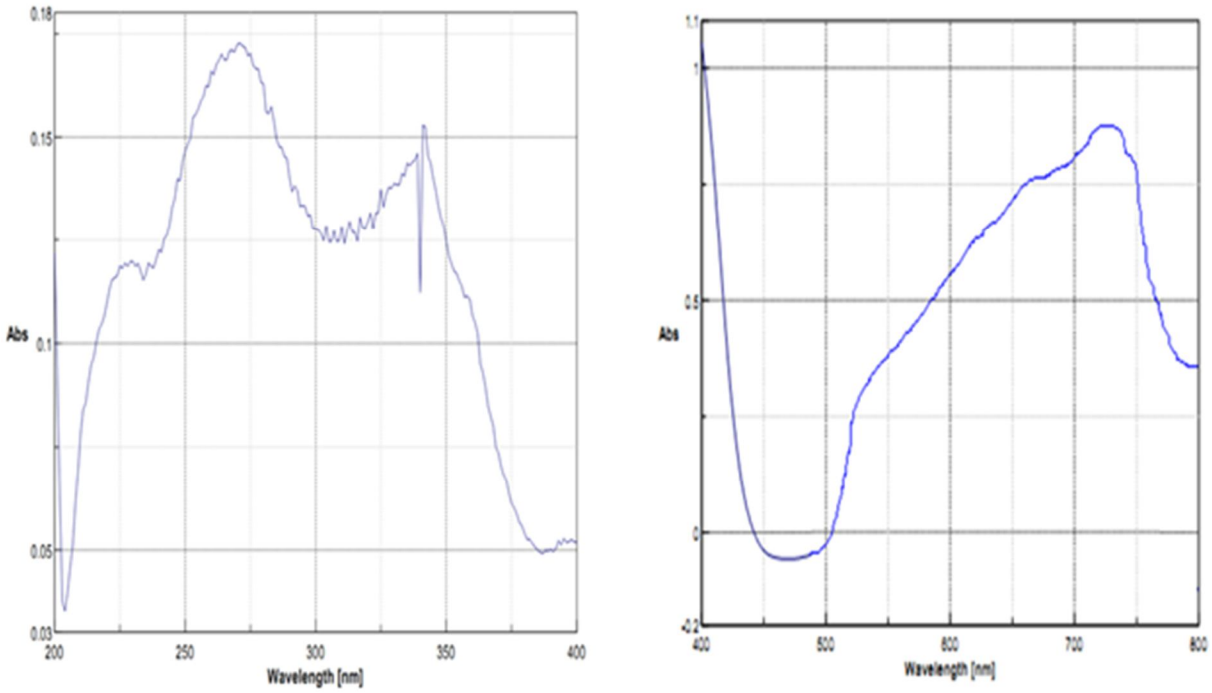

Fig 5.1: Wavelength scanning spectrum of Olmesartan in UV region and in visible region.

S.NO	UV method		FC method	
	Concentration (µg/ml)	Average Absorbance	Concentration (µg/ml)	Average Absorbance
1	1	0.117	0.5	0.077
2	2	0.167	1	0.101
3	3	0.221	1.5	0.121
4	4	0.268	2	0.144
5	5	0.315	2.5	0.163
6	6	0.362	3.0	0.183
7	7	0.419		
8	8	0.467		
9	9	0.521		
10	10	0.569		
	Slope Intercept Correlation Coefficient	0.0502 0.0667 0.9997	Slope Intercept Correlation Coefficient	0.0422 0.0576 0.9997

Table 5.1: Calibration Curve Results of Olmesartan in UV Method

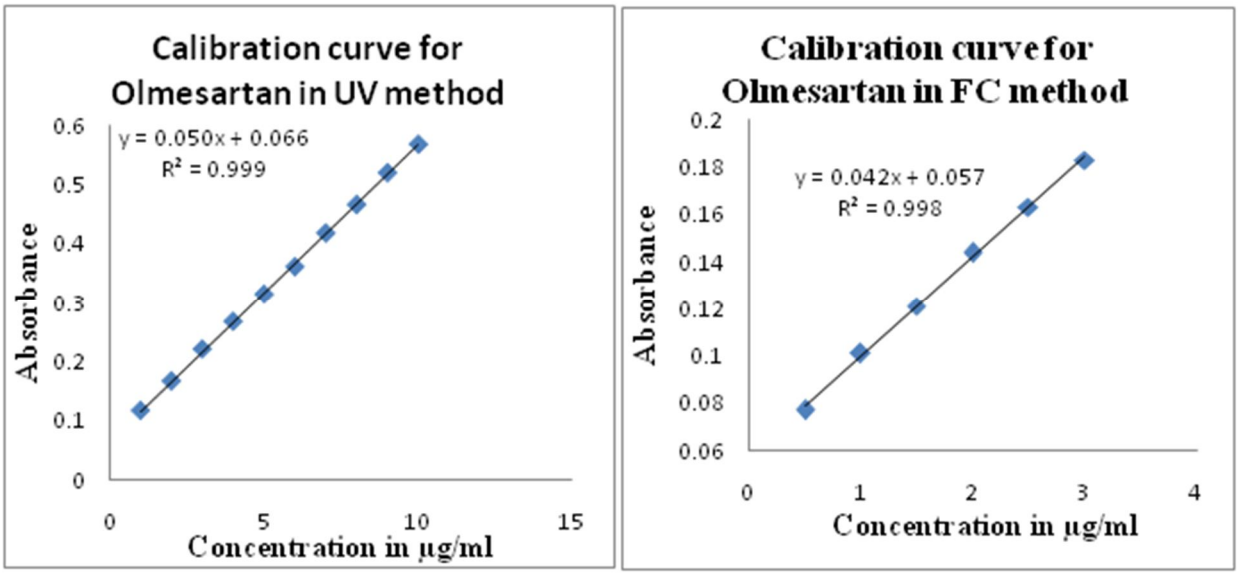

Figure 5.2: Calibration Curve of Olmesartan in UV Method and in FC method

5.1Formulation Assay:

The absorbance of the prepared formulation solutions was measured and from the resultant sample values % assay was calculated. In the entire brand under study, % assay was found to be more than 98%. High amount of drug was estimated in Olmetrack brand whereas low amount of Olmesartan was estimated in Olmezest brand. Hence the fallowed method was successfully applied for the estimation of Olmesartan. Results of the essay studies were shown in table 5.2

S.NO	Brand	Dosage	Amount Prepared	%Assay
UV method	Olsertan	40mg	10µg/ml	99.12
	Olsertan	20mg	10µg/ml	98.93
	Olmetrack	20mg	10µg/ml	99.22
	Olmezest	20mg	10µg/ml	98.89
FC method	Olsertan	40mg	10µg/ml	99.76
	Olsertan	20mg	10µg/ml	98.11
	Olmetrack	20mg	10µg/ml	98.49
	Olmezest	20mg	10µg/ml	99.60

Table 5.2: Formulation results of Olmesartan in UV and FC Method

6.0Conclusion

One visible and one UV spectrophotometric method was followed for the estimation of Olmesartan in different marketed formulations. Both the methods can successfully estimate the amount of drug in formulations with high accuracy. Formulation excepients does not interfere in the estimation in both UV and visible region. Hence more than 98% assay was found in both the estimation methods.

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