



## Research Article

# Development and Validation of UV Spectrophotometric Methods for the Simultaneous Estimation of Glimepiride and Linagliptin

Ayesha Godal\*, Deepshree Buntariya, Dr. Madhuri Hinge

Department of Pharmaceutical Quality Assurance, ROFEL Shri G.M. Bilakhia College of Pharmacy, Vapi, Gujarat.

### ARTICLE INFO

Published: 12 Mar 2026

**Keywords:**

Glimepiride (GLM),  
Linagliptin (LIN), First  
Order Derivative Method,  
Absorption Correction  
Method.

**DOI:**

10.5281/zenodo.18981722

### ABSTRACT

This research aimed to develop simple, specific, accurate, precise, reproducible, and robust UV spectrophotometric methods for the simultaneous estimation of Glimepiride and Linagliptin. First Order Derivative Method and Absorption Correction Method was developed using UV spectrophotometry and were validated as per ICH guideline. For First Order Derivative Method wavelength selected was 255 nm for GLM (ZCP of LIN) and 232.5 nm for LIN (ZCP of GLM) and for Absorption Correction Method wavelength selected was 228 nm and 294 nm. The linearity was established for above method over the concentration range of 2-6 µg/ml for GLM and 5-15 µg/ml for LIN with correlation coefficient R<sup>2</sup> for First Order Derivative 0.9963 and 0.9983 and for Absorption Correction Method 0.9980 and 0.9996 respectively.

### INTRODUCTION

Diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin or if the body and use of insulin is inefficient. Insulin is a hormone which helps control blood sugar. Without control, diabetes causes hyperglycaemia or high blood sugar, which causes catastrophic damage to many bodies and systems, including neurons and blood vessels, over time.<sup>[1,2]</sup>

**Glimepiride (GLM):** Glimepiride (GLM) is chemically known as 1-[[4-[2-(3-ethyl-4-methyl-

2-oxo-3-pyrroline-1-carboxamido) ethyl] phenyl] sulphonyl]-3-trans-(4-methyl cyclohexyl) urea with Molecular Formula and Molecular Weight, C<sub>24</sub>H<sub>34</sub>N<sub>4</sub>O<sub>5</sub>S and 490.6 gm/mole respectively belonging to the Antidiabetic category, shown in Fig. 1. Glimepiride is insoluble in water and soluble in methanol. Mechanism of this drug is, it inhibits ATP-sensitive potassium channel by binding non-specifically to the B sites of both sulfonylurea receptor-1 (SUR1) and sulfonylurea receptor-2A (SUR2A) subunits as well as the A site of SUR1 subunit of the channel to promote insulin secretion from the beta cell.<sup>[3,4]</sup>

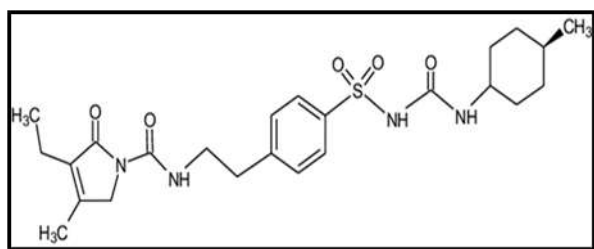
\*Corresponding Author: Ayesha Godal

Address: ROFEL Shri G.M. Bilakhia College of Pharmacy, Vapi, Gujarat

Email ✉: [ayeshagodal0510@gmail.com](mailto:ayeshagodal0510@gmail.com)

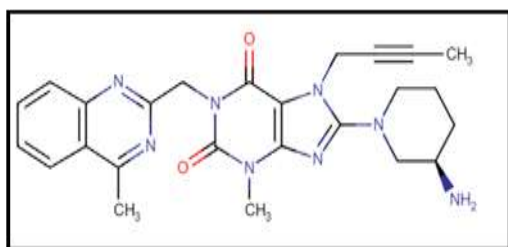
**Relevant conflicts of interest/financial disclosures:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.





**Figure 1: Chemical Structure of Glimepiride**

**Linagliptin (LIN):** Linagliptin (LIN) is chemically known as 8-[(3R)-3-aminopiperidin-1-yl]-7-(but-2-yn-1-yl)-3-methyl-1-[(4-methylquinazolin-2-yl) methyl] purine-2,6-dione with Molecular Formula and Molecular Weight,  $C_{25}H_{28}N_8O_2$  and 472.5gm/mole respectively belonging to the Antidiabetic category, shown in Fig. 2. Linagliptin is freely soluble in water and very soluble in methanol. Mechanism of this drug is, Linagliptin is an inhibitor of DPP-4, an enzyme that degrades the incretin hormones glucagon-like peptide-1 (GLP-1) and glucose-dependent insulintropic polypeptide (GIP).<sup>[5,6]</sup>



**Figure 2: Chemical Structure of Linagliptin**

## MATERIALS AND METHODS

### Chemicals and Reagents

Analytically pure samples of Glimepiride and Linagliptin were kindly supplied by Exemed Pharmaceuticals, Methanol (UV Grade – Thomas Baker, Mumbai)

### Instrument used

Electronic Weighing Balance (Shimadzu 0.1 mg), Ultrasonicator (Athena Technology), UV VIS Spectrophotometer (Shimadzu UV-1800)

**Development of Spectrophotometric method and Selection of Solvent:** Glimepiride and Linagliptin solution (1000  $\mu\text{g} / \text{ml}$ ) was prepared with solvent methanol. These solutions were scanned in the UV visible range (200 nm to 800 nm) to determine absorption intensity and absorption wavelength.

### Preparation of Standard Solution:

**1. Preparation of GLM and LIN standard stock solution (1000  $\mu\text{g}/\text{ml}$ ):** Accurately weigh 10 mg of drug, transfer it to a 10 mL volumetric flask, dissolve in methanol, and make up the volume to the mark with methanol to obtain a 1000  $\mu\text{g}/\text{mL}$  solution.

**2. Preparation of GLM and LIN working stock solution (100  $\mu\text{g}/\text{ml}$ ):** Pipette 1 mL of the prepared standard stock solution into a 10 mL volumetric flask and make up the volume to the mark with methanol to obtain a 100  $\mu\text{g}/\text{mL}$  solution.

### First Order Derivative Spectroscopic Method

All zero order spectrum (D0) were converted to first order derivative spectrum (D1) and the overlain first order derivative spectrums of GLM and LIN at different concentration were recorded. The wavelengths reported were 255 nm for GLM (ZCP of LIN) and 232.5 nm for LIN (ZCP of GLM).

### Absorption Correction Method

The standard solution of Glimepiride and Linagliptin were diluted with methanol to get the concentration of 2-6  $\mu\text{g}/\text{ml}$  and 5-15  $\mu\text{g}/\text{ml}$  of respectively. The drugs were scanned in the UV range 200-400 nm. The wavelengths selected were 228 nm for Glimepiride and 294 nm for Linagliptin.

### Preparation of Calibration Curve

### Calibration Curve for GLM and LIN:

Calibration curves were prepared using five different concentrations of standard solutions of GLM (2–6 µg/mL) and LIN (5–15 µg/mL). Each solution was scanned against methanol as blank and the corresponding spectra were recorded. The  $dA/d\lambda$  absorbance was measured at 255 nm for GLM (ZCP of LIN) and at 232.5 nm for LIN (ZCP of GLM). Calibration curves of  $dA/d\lambda$  absorbance versus concentration were plotted, and the respective regression equations were obtained.

**Preparation of Sample solution:** A synthetic mixture (tablet) equivalent to 2 mg of GLM and 5 mg of LIN was taken into 100 ml of volumetric flask and added 10 ml of methanol, the solution was warmed for 5-10 mins, ultrasonicated for 20 mins, followed by addition of 50 ml methanol and ultrasonicated for 15 min and was makeup upto the mark with methanol. The solution was filtered through Whatmann filter paper no. 41. Thus, resulting solution gave 20 µg/ml of GLM and 50 µg/ml of LIN respectively. From the above solution, 1 ml was pipette out and transferred to 10 ml volumetric flask and volume was made upto mark with methanol in order to give a solution containing GLM (2 µg/ml) + LIN (5 µg/ml). Absorbance of resulting solution was recorded by converting zero order spectra into first order at 255 nm for GLM (ZCP of LIN) and 232.5 nm for LIN (ZCP of GLM).

### Validation of Proposed Method<sup>[7-9]</sup>

**1. Linearity (n = 5):** Linearity was evaluated by analyzing five concentration levels in the range of 2–6 µg/mL for GLM and 5–15 µg/mL for LIN. Calibration curves of  $dA/d\lambda$  absorbance versus concentration were plotted, and the correlation coefficients and regression equations for GLM and LIN were determined.

### 2. Precision

#### a) Repeatability (n=6)

An aliquot of 0.4 mL of GLM working stock solution (100 µg/mL) and 1.0 mL of LIN working stock solution (100 µg/mL) were transferred into a 10 mL volumetric flask. The volume was made up to the mark with methanol to obtain a solution containing 4 µg/mL of GLM and 10 µg/mL of LIN. The solution was analyzed six times (n = 6), and %RSD was calculated.

**b) Intraday Precision (n=3)** Aliquots of 0.3, 0.4, and 0.5 mL of GLM working stock solution (100 µg/mL) and 0.75, 1.0, and 1.25 mL of LIN working stock solution (100 µg/mL) were transferred into separate 10 mL volumetric flasks. The volume was made up to the mark with methanol to obtain solutions containing 3, 4, and 5 µg/mL of GLM and 7.5, 10, and 12.5 µg/mL of LIN. Each solution was analyzed three times (n = 3) on the same day at short time intervals, and %RSD was calculated.

**c) Interday Precision (n=3)** Aliquots of 0.3, 0.4, and 0.5 mL of GLM working stock solution (100 µg/mL) and 0.75, 1.0, and 1.25 mL of LIN working stock solution (100 µg/mL) were transferred into a series of 10 mL volumetric flasks. The volume was made up to the mark with methanol to obtain solutions containing 3, 4, and 5 µg/mL of GLM and 7.5, 10, and 12.5 µg/mL of LIN. Each solution was analyzed three times (n = 3) on three different days, and %RSD was calculated.

### 3. Accuracy (n=3)

Accuracy of the method was assessed by standard addition method at different concentration levels i.e. 80%, 100% and 120%) and % recoveries were computed.



$$\% \text{ Recovery} = \frac{A - B}{C},$$

intercepts of calibration curves and average slope of calibration curves.

Where, A = Total amount of drug estimated

B = Amount of drug found on pre analysed basis

C = Amount of Pure drug added

$$\text{LOD} = 3.3 \times \text{S.D./Slope}$$

$$\text{LOQ} = 10 \times \text{S.D./Slope}$$

#### 4. LOD and LOQ

Detection limit and quantitation limit were determined based on the standard deviation of y-

#### RESULT AND DISCUSSION:

##### FIRST ORDER DERIVATIVE METHOD:

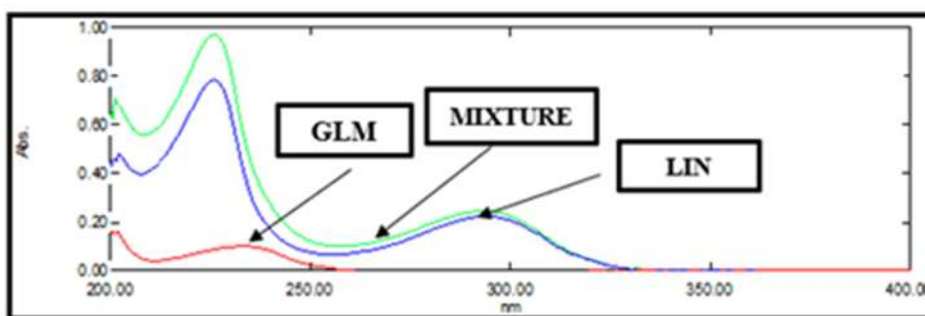


Figure 1: Overlain Spectra of GLM (2 µg/ml), LIN (5 µg/ml) and MIXTURE (2 + 5 µg/ml)

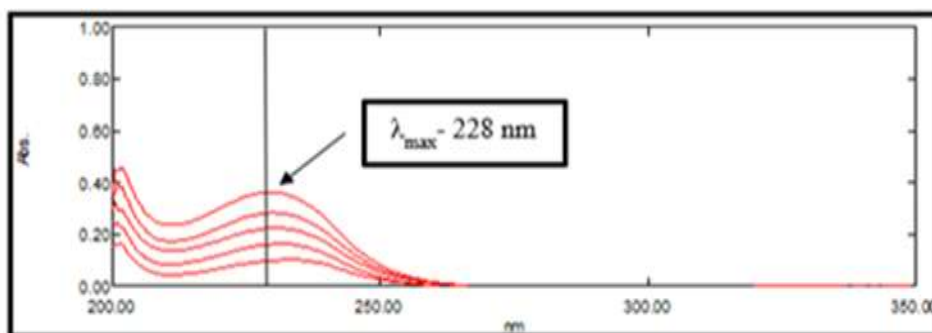


Figure 2: Zero Order Spectra of GLM (2-6 µg/ml)

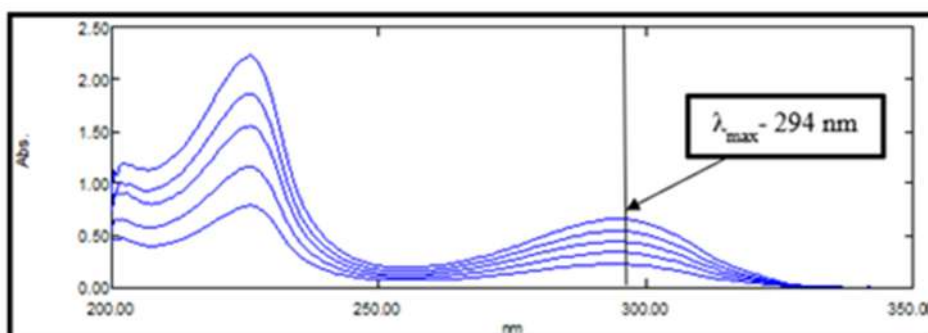


Figure 3: Zero Order Spectra of LIN (5-15 µg/ml)

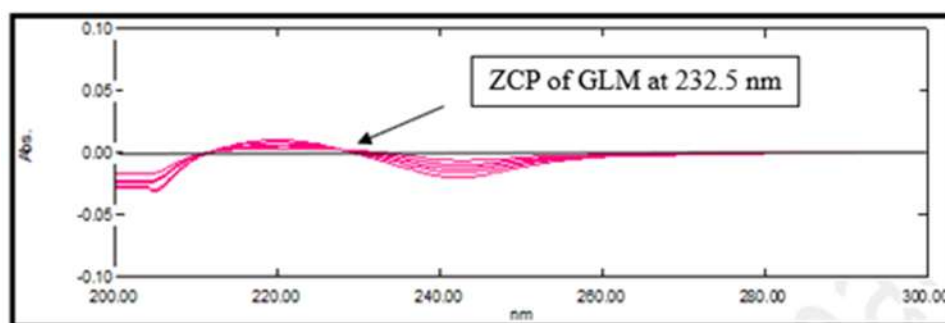


Figure 4: ZCP of GLM at 232.5 nm

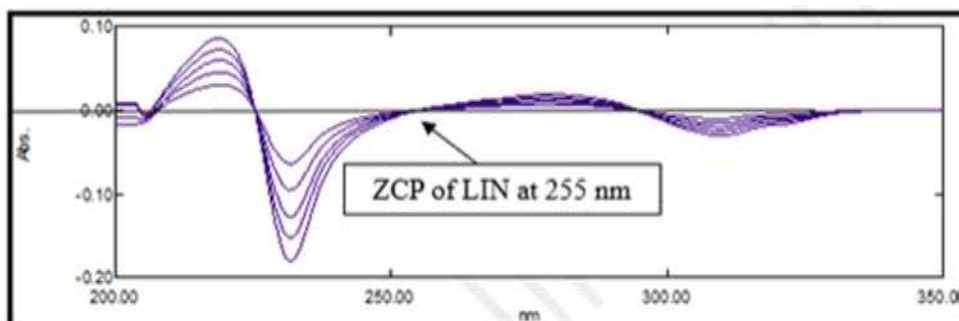


Figure 5: ZCP of LIN at 255 nm

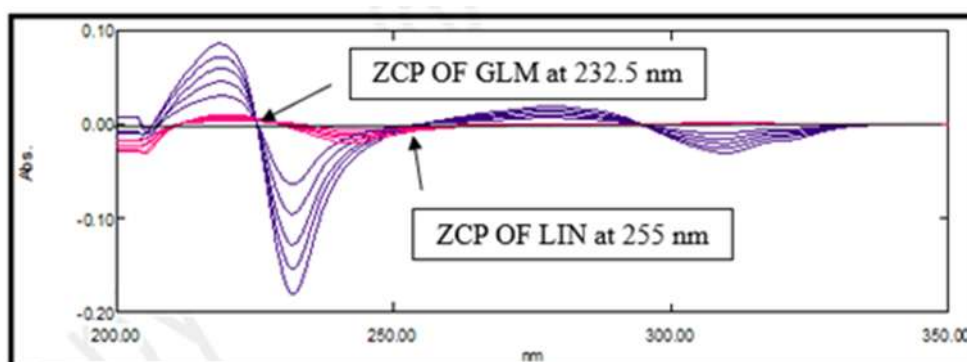


Figure 6: Overlain Spectra of GLM (2-6 µg/ml) and LIN (5-15 µg/ml)

**Validation of proposed UV method:**

µg/ml respectively. Linearity data for GLM at 255 nm and LIN at 232.5 nm.

**1. Linearity:** The linearity for GLM and LIN was found to be in the range of 2-6 µg/ml and 5-15

**Table 1: Linearity of GLM at 255 nm (ZCP of LIN)**

Sr. No.	Concentration (µg/ml)	Mean Abs. ± S.D. (n=5)	%R.S.D
1.	2	0.0024 ± 0.000017	0.7083
2.	3	0.0034 ± 0.000021	0.6176
3.	4	0.0044 ± 0.000025	0.5681
4.	5	0.0057 ± 0.000026	0.4561
5.	6	0.0062 ± 0.000023	0.3709

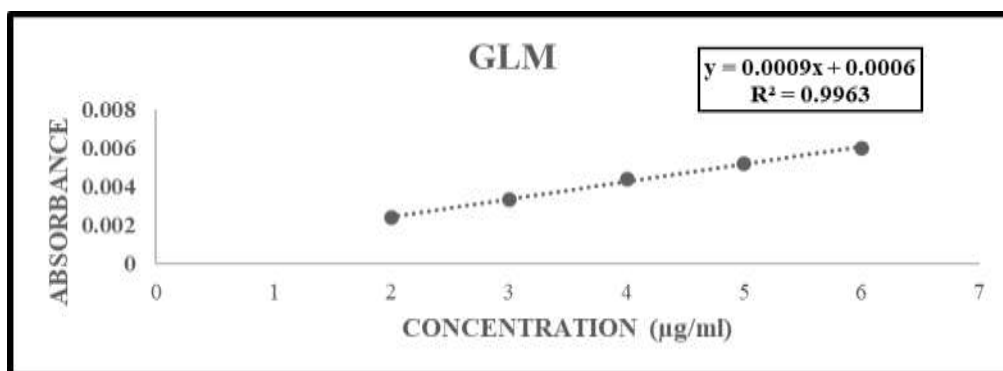


Figure 7: Calibration Curve of GLM at 255 nm (ZCP of LIN)

Table 2: Linearity of LIN at 232.5 nm (ZCP of GLM)

Sr. No.	Concentration (µg/ml)	Mean Abs. ± S.D. (n=5)	%R.S.D
1.	5	0.0631 ± 0.000513	0.8129
2.	7.5	0.0930 ± 0.000673	0.7236
3.	10	0.1252 ± 0.000789	0.6301
4.	12.5	0.1504 ± 0.000868	0.5771
5.	15	0.1780 ± 0.000885	0.4971

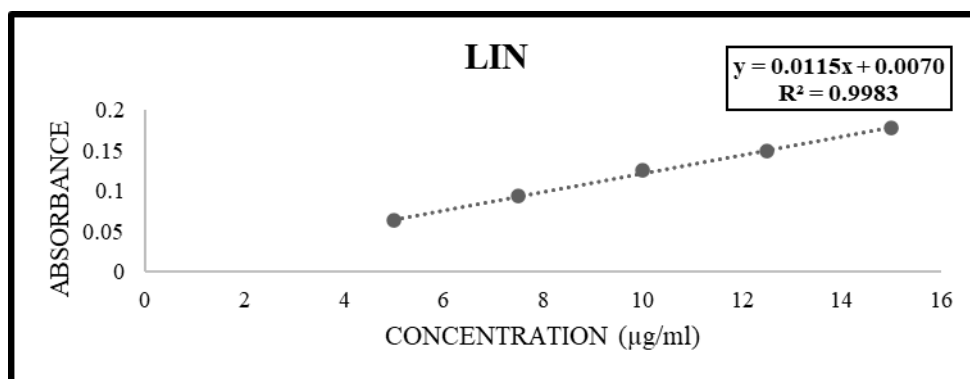


Figure 8: Calibration Curve of LIN at 232.5 nm (ZCP of GLM)

## 2. PRECISION

### a) Repeatability (n=6):

The data of Repeatability for GLM at 255 nm (ZCP of LIN) and LIN at 232.5 nm (ZCP of GLM) is shown in table.

Table 3: Repeatability data for GLM and LIN

Sr. No.	Drugs	Concentration (µg/ml)	Mean Abs. ± S.D. (n=6)	%R.S.D
1.	GLM	4	0.0047 ± 0.000028	0.5957
2.	LIN	10	0.1270 ± 0.000855	0.6732

### b) Intraday Precision (n=3):

The data of Intraday Precision for GLM at 255 nm (ZCP of LIN) and LIN at 232.5 nm (ZCP of GLM) is shown in table.

**Table 4: Intraday Precision for GLM at 255 nm**

Sr. No.	Concentration (µg/ml)	Mean Abs. ± S.D. (n=3)	%R.S.D
1.	3	0.0037 ± 0.000025	0.6756
2.	4	0.0049 ± 0.000031	0.6326
3.	5	0.0059 ± 0.000032	0.5423

**Table 5: Intraday Precision for LIN at 232.5 nm**

Sr. No.	Concentration (µg/ml)	Mean Abs. ± S.D. (n=3)	%R.S.D
1.	7.5	0.0940 ± 0.000729	0.7755
2.	10	0.1291 ± 0.000946	0.7327
3.	12.5	0.1520 ± 0.000998	0.6565

**c) Interday Precision (n=3):**

The data of Interday Precision for GLM at 255 nm (ZCP of LIN) and LIN at 232.5 nm (ZCP of GLM) is shown in table.

**Table 6: Interday Precision for GLM at 255 nm**

Sr. No.	Concentration (µg/ml)	Mean Abs. ± S.D. (n=3)	%R.S.D
1.	3	0.0043 ± 0.000032	0.7441
2.	4	0.0057 ± 0.000041	0.7192
3.	5	0.0066 ± 0.000042	0.6363

**Table 7: Interday Precision for LIN at 232.5 nm**

Sr. No.	Concentration (µg/ml)	Mean Abs. ± S.D. (n=3)	%R.S.D
1.	7.5	0.0973 ± 0.000840	0.8633
2.	10	0.1315 ± 0.001065	0.8098
3.	12.5	0.1587 ± 0.001184	0.7460

**3. Accuracy:**

Accuracy of the proposed method was assured by performing recovery study from synthetic mixture at three levels by standard addition method.

Percentage recovery for GLM and LIN at 232.5 nm and 255 nm were obtained respectively. The result is depicted in table. Recovery was found to be in the limit of 98-102%.

**Table 8: Determination of accuracy of GLM and LIN**

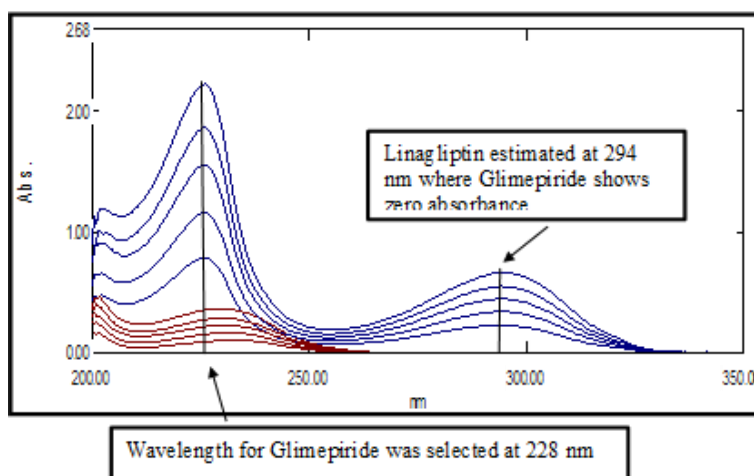
Drugs	Level	Amount of sample (µg/ml)	Amount of std. spiked (µg/ml)	Total amount (µg/ml)	Amount of sample found (µg/ml)	% Recovery
GLM	0%	2	0	2	1.982	99.10
	80%	2	1.6	3.6	3.582	99.50
	100%	2	2	4	3.989	99.72
	120%	2	2.4	4.4	4.411	100.25
LIN	0%	5	0	5	4.954	99.08
	80%	5	4	9	8.927	99.18
	100%	5	5	10	9.938	99.38
	120%	5	6	11	11.003	100.02

#### 4. Analysis of synthetic mixture:

**Table 9: Determination of Assay of GLM and LIN**

Synthetic Mixture (Tablet)	Actual concentration (µg/ml)		Amount obtained Mean ± S.D. (n=5) (µg/ml)		GLM %Purity ± S.D. (n=5)	LIN %Purity ± S.D. (n=5)
	GLM	LIN	GLM	LIN	99.20 ± 0.0387	99.12 ± 0.0158
	2	5	1.984 ± 0.0015	4.956 ± 0.0012		

**ABSORPTION CORRECTION METHOD:** Selection of wavelength for estimation of Glimepiride and Linagliptin:



**Figure 9: Overlain Spectra of GLM (2-6 µg/ml) and LIN (5-15 µg/ml)**

**Validation of proposed UV method:**

The linearity range for GLM and LIN was found to be in the range of 2-6 µg/ml and 5-15 µg/ml respectively. Linearity data for GLM at 228 nm and LIN at 294 nm.

##### 1. Linearity:

**Table 10: Linearity of GLM at 228 nm**

Sr. No.	Concentration (µg/ml)	Mean Abs ± S.D. (n=5)	%R.S.D
1.	2	0.0941 ± 0.000688	0.7311
2.	3	0.1562 ± 0.000991	0.6344
3.	4	0.2180 ± 0.001197	0.5490
4.	5	0.2790 ± 0.001245	0.4462
5.	6	0.3618 ± 0.001301	0.3595

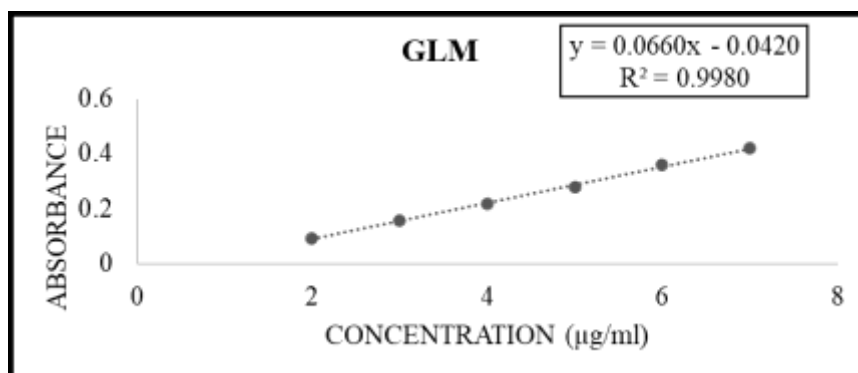


Figure 10: Calibration Curve of GLM at 228 nm

Table 11: Linearity of LIN at 294 nm

Sr. No.	Concentration (µg/ml)	Mean Abs ± S.D. (n=5)	%R.S.D
1.	5	0.2244 ± 0.001880	0.8377
2.	7.5	0.3364 ± 0.002544	0.7562
3.	10	0.4416 ± 0.002922	0.6616
4.	12.5	0.5434 ± 0.002925	0.5382
5.	15	0.6584 ± 0.003256	0.4945

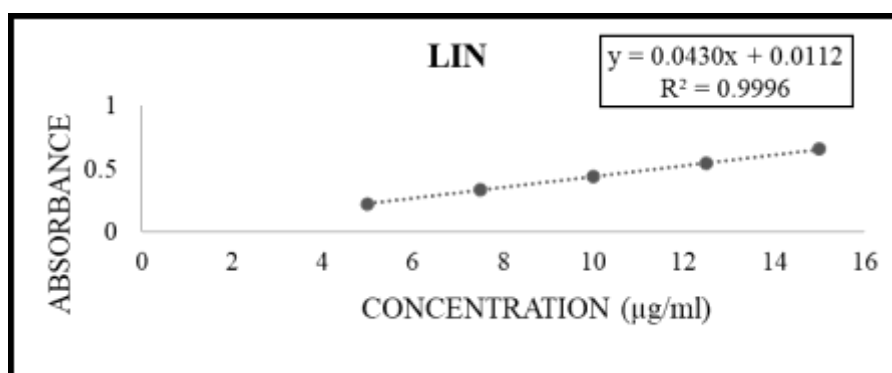


Figure 11: Calibration Curve of LIN at 294 nm

## 2. PRECISION

The data of Repeatability for GLM at 228 nm and LIN at 294 nm is shown in table.

### a) Repeatability (n=6):

Table 12: Repeatability data for GLM and LIN

Sr. No.	Drugs	Concentration (µg/ml)	Mean Abs ± S.D. (n=6)	%R.S.D
1.	GLM	4	0.2196 ± 0.001262	0.5746
2.	LIN	10	0.4434 ± 0.003072	0.6928

### b) Intraday Precision (n=3):

Table 13: Intraday Precision for GLM at 228 nm

Sr. No.	Concentration (µg/ml)	Mean Abs ± S.D. (n=3)	%R.S.D
1.	3	0.1582 ± 0.001090	0.6890
2.	4	0.2199 ± 0.001460	0.6639
3.	5	0.2801 ± 0.001541	0.5501

**Table 14: Intraday Precision for LIN at 294 nm**

Sr. No.	Concentration (µg/ml)	Mean Abs ± S.D. (n=3)	%R.S.D
1.	7.5	0.3380 ± 0.002661	0.7872
2.	10	0.4492 ± 0.003308	0.7364
3.	12.5	0.5476 ± 0.003296	0.6018

**c) Interday Precision (n=3):.**

**Table 15: Interday Precision for GLM at 228 nm**

Sr. No.	Concentration (µg/ml)	Mean Abs± S.D. (n=3)	%R.S.D
1.	3	0.1601 ± 0.001255	0.7838
2.	4	0.2220 ± 0.001604	0.7225
3.	5	0.2930 ± 0.001971	0.6726

**Table 16: Interday Precision for LIN at 294 nm**

Sr. No.	Concentration (µg/ml)	Mean Abs ± S.D. (n=3)	%R.S.D
1.	7.5	0.3518 ± 0.003072	0.8732
2.	10	0.4659 ± 0.003757	0.8063
3.	12.5	0.5912 ± 0.004245	0.7180

**3. Accuracy:**

Accuracy of the proposed method was assured by performing recovery study from synthetic mixture at three levels by standard addition method.

Percentage recovery for GLM and LIN at 228 nm and 294 nm were obtained respectively. The result is depicted in table. Recovery was found to be in the limit of 98-102%.

**Table 17: Determination of accuracy of GLM and LIN**

Drugs	Level	Amount of sample (µg/ml)	Amount of std. spiked (µg/ml)	Total amount (µg/ml)	Amount of sample found (µg/ml)	% Recovery
GLM	0%	2	0	2	1.982	99.10
	80%	2	1.6	3.6	3.572	99.22
	100%	2	2	4	3.982	99.55
	120%	2	2.4	4.4	4.414	100.31
LIN	0%	5	0	5	4.957	99.14
	80%	5	4	9	8.934	99.26
	100%	5	5	10	9.979	99.79
	120%	5	6	11	11.030	100.27

**4. Analysis of synthetic mixture:**

**Table 18: Determination of Assay of GLM and LIN**

Synthetic Mixture (Tablet)	Actual concentration (µg/ml)		Amount obtained Mean ± S.D. (n=5) (µg/ml)		GLM %Purity ± S.D. (n=5)	LIN %Purity ± S.D. (n=5)
	GLM	LIN	GLM	LIN	99.25 ± 0.0331	99.20 ± 0.0187
	2	5	1.985 ± 0.0027	4.960 ± 0.0007		

## CONCLUSION

The proposed UV Spectroscopic Methods were developed for simultaneous estimation of Glimepiride (GLM) and Linagliptin (LIN) in their synthetic mixture are simple, precise, accurate, and sensitive. They can be used for the routine analysis of both drugs in pharmaceutical formulations. The method was developed and validated as per ICH guidelines. The precision of the developed methods was confirmed by intra-day and inter-day analysis and the accuracy was confirmed by the recovery study. The %RSD was found to be <2.0%. It indicates that the method has good precision and accuracy.

## ACKNOWLEDGEMENT

The authors are thankful to Exemed Pharmaceuticals Pvt. Ltd., Vapi, Gujarat, for providing the drugs Glimepiride and Linagliptin API as gift samples and also thankful to the Principal, ROFEL Shri G.M. Bilakhia College of Pharmacy, Vapi for providing necessary facilities, equipment and chemicals to complete the research work.

## REFERENCES

1. Ismail A and Ali S: A review of Diabetes Mellitus and its complications, *WJPMR*. (2022), 8(6), 239-241.
2. Chaudhary N and Tyagi N: Diabetes mellitus: An Overview, *Int. J. Res. Dev. Pharm. L. Sci t*. (2018), 7(4), 3030-3033.
3. Drug Profile, "Glimepiride", December 2023, <https://go.drugbank.com/drugs/DB00222>
4. Drug Profile, "Glimepiride", December 2023, <https://pubchem.ncbi.nlm.nih.gov/#query=glimepiride>
5. Drug Profile, "Linagliptin", December 2023, <https://go.drugbank.com/drugs/DB08882>
6. Drug Profile, "Linagliptin", December 2023, <https://pubchem.ncbi.nlm.nih.gov/#query=Linagliptin>
7. ICH Harmonized Tripartite Guideline, Validation of analytical procedures: text and methodology Q2 (R2). International Conference on Harmonization, Geneva, Switzerland, 2005, pp 4-13.
8. Beckett AH., Stenlake JB. *Practical Pharmaceutical Chemistry*; CBS Publisher and Distributors, New Delhi, 4th Edn; Part II, 2002, pp 279-300.
9. Chatwal GR, Anand SK. *Instrumental methods of chemical analysis*; Himalaya publishing house Mumbai, 5th Edn; 2002, pp 2149-2184.
10. Karajgi S, Mali S, Kotnal R: Novel first order derivative UV Spectrophotometric Method for the determination of Glimepiride in solid dosage forms. *IJDDT*. (2018), 8(3), 121-126.
11. Naveed S, Qamar H, Wardha Jawaid, Urooj Bokhari: Simple UV spectrophotometric assay of Glimepiride. *Open Science Journal of Clinical Medicine*. (2014), 2(4), 94-97.
12. Merekar AN, Merekar SA ,Dokhe MD ,Darekar PP, Vitnor HB: Development and validation of UV spectrophotometric methods for simultaneous estimation of Metformin Hydrochloride and Glimepiride in pure and tablet dosage form. *Eur. Chem. Bull*. (2023), 12(13), 11-23.
13. Gulve SA, Tarkase K. N., Mundhe D. B. and Hajare P. P: Development and validation of derivative spectrophotometric method for estimation of Pioglitazone HCl and Glimepiride in bulk and combine dosage form. *Der Pharma Chemica*. (2013), 5(3), 122-127.
14. Suvitha BG, Vijayabharati R, Arun R: Development and validation of analytical method for the estimation of Linagliptin by UV spectroscopy in pharmaceutical



- Formulations. *Zeichen J.* (2022), 8(07), 459-466.
15. Mishra M and Verma G: Analytical method development and validation for determination of linagliptin in bulk and dosage form by UV spectroscopy. *JETIR.* (2018), 5(7), 908-912.
16. Rane SS, Chaudhari RY, Patil VR et al: Development and validation of a UV spectrophotometric method for simultaneous estimation of Empagliflozin and Linagliptin in bulk and pharmaceutical dosage form. *DIMPS-IJ.* (2021),1(1), 44-53.
17. Amrutiya FR, Patel Bhumi R, Patel JG, et al: Development And Validation of first order derivative spectrophotometric method for determination of Empagliflozin and Linagliptin. *Int J Pharm. Drug. Anal.* (2017),5(4),129-135.
18. Drug Information, "Central Drugs Standard Control Organisation Directorate General Of Health Services Ministry Of Health & Family Welfare, Government of India", [https://cdsco.gov.in/opencms/opencms/system/modules/CDSCO.WEB/elements/download\\_file\\_division.jsp?num\\_id=MTA0NTA=](https://cdsco.gov.in/opencms/opencms/system/modules/CDSCO.WEB/elements/download_file_division.jsp?num_id=MTA0NTA=)

**HOW TO CITE:** Ayesha Godal, Deepshree Bumtariya, Dr. Madhuri Hinge, Development and Validation of UV Spectrophotometric Methods for the Simultaneous Estimation of Glimepiride and Linagliptin, *Int. J. of Pharm. Sci.*, 2026, Vol 4, Issue 3, 1319-1330. <https://doi.org/10.5281/zenodo.18981722>

