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Review Article

**A REVIEW ON ANALYTICAL METHODS FOR
GLIBENCLAMIDE BY HPLC****Banothu Bhadru*, Tadikonda Rama Rao, Sappidi Harshitha**

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Abstract:

Glibenclamide, or glyburide, is a second-generation sulfonylurea that effectively lowers blood sugar in type-2 diabetes patients who do not require insulin. Symptoms of low blood sugar may include excessive thirst, fatigue, dizziness, increased hunger, and blurred vision. It should be used alongside a proper diet and exercise and can be combined with other diabetes treatments, but is not suitable for type-1 diabetes. Common side effects include nausea, heartburn, weight gain, and bloating, with a notable risk of hypoglycemia and angioedema. Its use is generally discouraged during pregnancy but may be acceptable while breastfeeding. Glibenclamide stimulates insulin secretion from the pancreas and is contraindicated in patients with sulfonamide allergies, type-1 diabetes, ketoacidosis, or severe renal or hepatic impairment. This article also discusses validated analytical techniques, particularly High Performance Liquid Chromatography (HPLC), for quantifying Glibenclamide in pharmaceutical formulations.

Key words: Glibenclamide, HPLC, Accuracy, Precision, ICH, Validation

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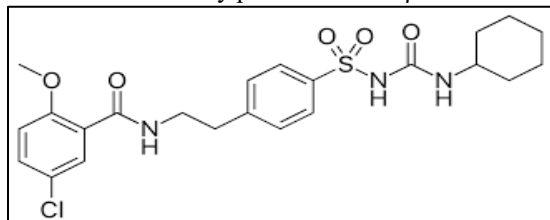
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INTRODUCTION:

Glibenclamide, chemically known as 5-chloro-N- [2-[4-(cyclohexyl carbamoyl sulfamoyl) phenyl] ethyl]-2-methoxybenzamide; hydrochloride, is a second-generation sulfonylurea drug widely used in the treatment of type 2 diabetes ⁽¹⁾. Its chemical formula is C₂₃H₂₈ClN₃O₅S. Type- 2 diabetes mellitus (T2DM) is characterized by insulin resistance and/or abnormal secretion of insulin by pancreatic islet β-cells ⁽²⁾.

**Figure 1: Chemical Structure of Glibenclamide**

Glibenclamide blocks ATP-sensitive potassium channels in pancreatic beta cells, causing depolarization and increased intracellular calcium, which promotes insulin release and lowers blood glucose levels ⁽³⁾. Symptoms of high blood sugar include frequent urination, increased thirst, and increased hunger⁽⁴⁾. The article also reviews analytical methods, particularly Reverse Phase High Performance Liquid Chromatography (RP-HPLC), for measuring Glibenclamide, validated per ICH guidelines ⁽⁵⁾.

Table.No.1: Summary of the list of articles

S.No	Author name	Journal name	Title name	Analytical conditions
1.	Ashwini. M et al, 2019 ⁽⁶⁾	International research journal of pharmacy	HPLC method development and validation for determination of Glibenclamide in pharmaceutical dosage forms.	Solvent: Acetonitrile: phosphate buffer (70:30) as mobile Phase λ max: 235nm Linearity: 20-80µg/ml. Correlation coefficient: 0.999. % RSD: Less than one.
2.	Tella et al, 2019 ⁽⁷⁾	Journal of Advances in Medicine and Medical Research	Physicochemical Equivalence and Validation of an HPLC Analytical Method for the Quantification of Glibenclamide and Its Sulfonamide Impurity in Prescribed Glibenclamide Tablets.	Solvent: Acetonitrile (CAN): Potassium dihydrogen orthophosphate (KH ₂ PO ₄) (43:57) as mobile phase λ max: 250nm Regression coefficients (R ²): 0.9993 and 0.9991

3.	Anisahtul et, al 2018 ⁽⁸⁾	Journal of Advanced Pharmaceutical Technology & Research	Development and validation of simple simultaneous analysis for amlodipine and Glibenclamide by non-derivatisation high-performance liquid chromatography-fluorescence.	RP C18 4 mm × 4 mm, 5 μm) MP: acetonitrile, phosphate buffer pH 3.0 μ (20:80) λ _{max} : 361nm excitation , 442 nm emission of AML λ _{max} : 235 nm excitation , 354 nm emission of GLM R ² =0.999
4.	Islam et al, 2018 ⁽⁹⁾	World Journal of Pharmacy and Pharmaceutical Sciences	Development and validation of stability-indicating RP-HPLC method for simultaneously estimation of Rosuvastatin and Glibenclamide.	Mobile phase: Methanol: Acetonitrile: 0.02M phosphate buffer pH 3.5(60:20:20 v/v/v) λ _{max} : 237 nm Linearity: 5-22 μg/ml (R ²): 0.999 and 0.998
5.	Mallikarjun bere et al., 2021 ⁽¹⁰⁾	International Journal of Innovative Research in Technology	Method Development and Validation for Estimation of Glyburide (GLIBENCLAMIDE) in Pharmaceutical Formulations and Rat Plasma by RP-HPLC.	Solvent: Acetonitrile (CAN): phosphate buffer (60:40v/v) as mobile phase Column: Kromasil ODS 3V (250×4.6mm, 5μ) in isocratic mode λ max: 238 nm. Linearity: (10-50 μg/ml)
6.	S.V.Thirunavukkarasu ⁽¹¹⁾	Pharmaceutics	Development and Validation of RP-HPLC Method for Determination of Glibenclamide in Pharmaceutical Dosage Forms	C18 : Gemini reversed phase column (Phenomenex, Torrance) 150 × 4.6 mm mobile phase : 0.05% Triethylamine (pH-3.5, adjusted with ortho phosphoric acid), acetonitrile and methanol (55:15:30 v/v) λ _{max} : 248nm flow rate: 1 ml min ⁻¹ . Linearity :40–300 mV R ² : 0.9998

7.	Venkata Siva Rao B et al.,2015 ⁽¹²⁾	International Journal of Trends in Pharmacy and Life Sciences	Analytical method Development and Validation for the assay of Metformin and Glibenclamide in bulk form by using RP-HPLC method	column: C18phenomenex Luna 25cm x 4.6mm, 5µ Mobile phase:Buffer and Methanol (25:75 v/v) flow rate : 1.0 ml/min λmax: 256nm Linearity :Glibenclamide (0.25-2.0 mcg/ml), Metformion HCl (125-450 mcg/ml)
8.	Arif Satria et,al.2018 ⁽¹³⁾	Journal of Advanced Pharmaceutical Technology & Research	Development and validation of simple simultaneous analysis for amlodipine and glibenclamide by non-derivatization high-performance liquid chromatography-fluorescence.	column RP 18 (4 mm × 4 mm, i.d., 5 µm) Mobile phase: acetonitrile and phosphate buffer pH 3.0 using a (20:80) λmax: 361 nm for λ excitation 442 nm for λ emission of AML λmax: 235 nm for λ excitation 354 nm for λ emission for GLI. R ² = value 0.999
9.	Agrawal et al.,2023 ⁽¹⁴⁾	International Journal of Drug Delivery Technology	Development and Validation of a Stability -Indicating RP-HPLC Method for Estimation of Glibenclamidei Bulk and Pharmaceutical Formulation.	column: Hypersil C18 4.6 (i.d.) x 250 mm x 5 m column Mobile phase : Methanol: Mixed Phosphate Buffer(70:30% v/v) λ max : 229nm flow rate : 1.0 mL/min Retention time : 2.1 minutes R ² :0.999.
10.	RK Godge et, al. 2020 ⁽¹⁵⁾	Research Journal of Pharmacy and Technology	RP-HPLC Method for estimation of Alogliptin and Glibenclamide in Synthetic mixture.	Mobile phase: Acetonitrile: Phosphate buffer pH-3.6 (65: 35) λmax: 240.0 nm Linearity: 1–5 µg/ml (r = 0.9998) for Alo , Linearity: 10–50 µg/ml (r = 0.9999) for Glib Retention time: 7.6 min
11.	Mahmoud M Sebaiy et, al 2019 ⁽¹⁶⁾	Egyptian journal of chemistry	Rapid RP-HPLC method for simultaneous estimation of some antidiabetics; Metformin, Gliclazide and Glimepiride in Tablets.	C8: 5µm, 2.50 x 4.60nm) Mobile phase: MeOH: 0.025M KH ₂ PO ₄ adjusted to pH 3.20 using ortho - phosphoric acid (70:30, v/v) λmax: 235nm. limits: 0.05, 1.21, 0.11µg/mL

12.	Basma M. Selima et al, 2022 ⁽¹⁷⁾	Records Of Pharmaceutical and Biomedical Sciences	Development and Optimization of a Green Stability Indicating HPLC Method for the Determination Metformin HCL and Glibenclamide in their Dosage Form	column: C18 (250×4.6 mm, 5µm) Mobile phase: ethanol, aqueous, potassium phosphate buffer, pH 3.0 (70:30:10) λ _{max} : 250 nm flow rate : 1.00 mL/min Linearity: 0.50-100.00µg mL ⁻¹ R ² : MET 0.9999, GLB 0.9996
13.	Haq N et al., 2014 ⁽¹⁸⁾	Iranian Journal of Pharmaceutical Research	Rapid Analysis of Glibenclamide Using an Environmentally Benign Stability-Indicating RP-HPLC Method	Column : Lichrosphere 250 X 4.0 mm RP C8 Mobile phase : ethanol: methanol (50:50 % v/v) Flow rate : 1.0 mL/min λ max : 245nm Linearity: 0.1-200 µg/mL Retention time : 2.55 ± 0.008 min
14.	Bhende et, al 2020 ⁽¹⁹⁾	Journal of chromatographic science	A sensitive HPTLC method for the estimation of Glibenclamide, rosiglitazone maleate and metformin hydrochloride from a multicomponent dosage form	SP: Pre-coated RP-18 F254s aluminum sheets Mp: Methanol –tetrahydrofuran – water–glacial acetic acid (16: 3.6: 4: 0.4, v/v) GLIBEN (r = 0.9991), ROSI (r = 0.9993) and MET (r = 0.9988)

CONCLUSION:

This review highlights that there are various spectroscopic and chromatographic methods available for analyzing Glibenclamide, whether individually or in combination. Methanol is commonly employed as the solvent in most chromatographic procedures. The techniques predominantly utilized include UV absorbance detection and RP-HPLC, as they offer exceptional precision, repeatability, and reliability. Additionally, these methods are straightforward, quick, and robust for quantitative analysis.

REFERENCES:

1. Donath MY, Schumann DM, Faulenbach M, Ellingsgaard H, Perren A. Islet inflammation in type 2 diabetes: from metabolic stress to therapy. *Diabetes Care*. 2008; 31(2):161-164.
2. Akash M, Shen Q, Rehman K, Chen S. Interleukin-1 receptor antagonist: a new therapy for type 2 diabetes mellitus. *J Pharm Sci*. 2012; 101(5):1647–1658.
3. Akash M, Rehman K, Chen S. Role of inflammatory mechanisms in pathogenesis of type 2 diabetes mellitus. *J Cell Biochem*. 2013; 114(3):525–531.
4. Fagninou, Adnette & Tougan, Ulbad P. & Nekoua, Magloire & Ruffine, Fachina & Akadiri, Yessoufou. *Diabetes mellitus: Classification, Epidemiology, Physiopathology, Immunology, Risk factors, Prevention and Nutrition*. *International Journal of Advanced Research*. 2019;7(7):855-863
5. Jaber LA, Antal EJ, Welshman IR. Pharmacokinetics and pharmacodynamics of glyburide in young and elderly patients with non-insulin dependent diabetes mellitus. *Ann Pharmacother*. 1996; 30(5):472–475.
6. Ashwini M, Sogali BS, Bhattacharyya S. HPLC Method Development and Validation for determination of Glibenclamide in Pharmaceutical Dosage Forms. *Int. Res. J. Pharm*. 2019; 10 (4):117-120.
7. Oluwagbemisola J. Saheed Oluwasina Oseni. Physicochemical Equivalence and Validation of an HPLC Analytical Method for the Quantification of Glibenclamide and Its Sulfonamide Impurity in Prescribed Glibenclamide Tablets in Nigeria. *Journal of*

- Advances in Medicine and Medical Research, 2019; 29(1):1-17.
8. Febrina A, Saputri A. Development and validation of simple simultaneous analysis for amlodipine and Glibenclamide by non derivatization high-performance liquid chromatography-fluorescence. Journal of Advanced Pharmaceutical Technology & Research. 2018; 9(4):124–129.
 9. Sheikh Hasibul Islam M, Alauddin F, Rafi Anwar. Development and validation of stability-Indicating RP-HPLC method for simultaneous estimation of Rosuvastatin and Glibenclamide. World Journal of Pharmacy and Pharmaceutical Sciences. 2018; 7(5):22–37.
 10. Mallikarjun Bere, Pasham Venkanna. Method Development and Validation for Estimation of Glyburide (Glibenclamide) In Pharmaceutical Formulations and Rat Plasma by RP-HPLC. IJIRT.2021; 8(3); 833-844.
 11. M. Jayanthi, S.V.Thirunavukkarasu, S. Raja. Development and Validation of RP-HPLC Method for Determination of Glibenclamide in Pharmaceutical Dosage Forms. International Journal of ChemTech Research .2012;4 (2), 593-601
 12. B.Venkata Siva Rao & K. Anil Kumar. Analytical method Development and Validation for the assay of Metformin and Glibenclamide in bulk form by using RP-HPLC method. Int J Trends in Pharm & Life Sci. 2015; 1(5); 676-682.
 13. Saputri A, Alawiyah A, Wira Kusuma AS. Development and validation of simple simultaneous analysis for amlodipine and glibenclamide by non-derivatization high-performance liquid chromatography-fluorescence. Journal of Advanced Pharmaceutical Technology & Research.2018; 9(4): 124–129.
 14. Pranita J, Agrawal R, Chambhare N, Sahare AY. Development and Validation of Stability - Indicating RP-HPLC Method for Estimation of Glibenclamide in Bulk and Pharmaceutical Formulation. International Journal of Drug Delivery Technology. 2023; 13(3):875-883.
 15. RK Godge, GS Shinde. RP-HPLC Method for estimation of Alogliptin and Glibenclamide in Synthetic mixture. Research Journal of Pharmacy and Technology. 2020; 13(2):555–559.
 16. Mahmoud M, Sobhy M. Rapid RP-HPLC method for simultaneous estimation of some antidiabetics; Metformin, Gliclazide and Glimepiride in Tablets. Egyptian journal of chemistry. 2019; 62(3):429–440.
 17. Basma M. Selima, Mahmoud M. Elkhoudaryb, Randa A. Development and Optimization of a Green Stability Indicating HPLC Method for the Determination Metformin HCL and Glibenclamide in their Dosage Form. Rec. Pharm. Biomed. Sci.2022; 6 (1), 84-100
 18. Nazrul Haqa,b, Fars Kaed Alanazia,c, Ibrahim Abdullah Alsarra. Rapid Analysis of Glibenclamide Using an Environmentally Benign Stability-Indicating RP-HPLC Method.IJPR 2014; 13 (3): 863-872
 19. Swati D Bhende, MB. Varanasi, konde abbulu. A sensitive HPTLC method for the estimation of Glibenclamide, rosiglitazone maleate and Metformin hydrochloride from a multi-componentdosageform.Journalofchromatographi cscience.2020; 58(5):418-426.