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UV Spectrophotometric Method Development and Validation for the Simultaneous Estimation of Antihypertensive Drugs

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ABSTRACT

The present study focuses on the analytical characterization and UV spectrophotometric method validation for two widely used antihypertensive drugs, **Olmesartan Medoxomil** and **Sacubitril Calcium**. FTIR spectroscopy confirmed the presence of functional groups such as –OH, C=O, and aromatic rings, indicating the structural integrity of both compounds. DSC analysis revealed sharp melting endotherms at 177.18°C for Olmesartan Medoxomil and 156.96°C for Sacubitril Calcium, confirming their thermal stability and purity. UV spectrophotometric analysis was performed to determine the λmax, which was found to be 255 nm for Olmesartan Medoxomil and 254 nm for Sacubitril Calcium. The method was validated as per ICH guidelines and showed excellent linearity, with correlation coefficients (R^2) of 0.9996 and 0.9995 respectively. Accuracy studies revealed percent recoveries close to 100%, while precision, robustness, and ruggedness assessments confirmed method reliability. The low LOD and LOQ values indicate good sensitivity. Overall, the developed method is simple, rapid, precise, and suitable for routine quality control of both drugs in pharmaceutical formulations.

Keywords: *Olmesartan Medoxomil; Sacubitril Calcium; FTIR; DSC; UV Spectrophotometry; Method Validation; Antihypertensive Drugs; ICH Guidelines*

1. INTRODUCTION

Hypertension remains one of the most prevalent chronic diseases globally, significantly contributing to cardiovascular complications such as stroke, heart failure, and kidney disease. Effective blood pressure management requires a combination of therapeutic interventions, among which pharmacological agents play a critical role. In recent years, the emergence of advanced antihypertensive drugs has revolutionized treatment protocols, emphasizing the need for precise, validated analytical methods to ensure accurate dosage and therapeutic efficacy. Analytical techniques serve as the backbone for quality control, pharmacokinetic studies, and therapeutic drug monitoring, thereby reinforcing drug safety and regulatory compliance. This study focuses on the analytical characterization and UV spectrophotometric method validation of two clinically significant antihypertensive drugs Olmesartan Medoxomil and Sacubitril Calcium by incorporating supportive physicochemical studies using FTIR spectroscopy and Differential Scanning Calorimetry (DSC).[1-8]

Olmesartan Medoxomil is a prodrug that, upon hydrolysis in the gastrointestinal tract, releases the active moiety Olmesartan. It belongs to the class of angiotensin II receptor blockers (ARBs) and exerts its antihypertensive action by selectively blocking the binding of angiotensin II to the AT1 receptor. This inhibition leads to vasodilation, reduced secretion of aldosterone, and decreased blood pressure. Due to its high efficacy and tolerability profile, Olmesartan Medoxomil is widely prescribed either alone or in combination with other antihypertensive agents.[9-12] From an analytical standpoint, its structural complexity and sensitivity to hydrolysis necessitate reliable characterization and quantification techniques. In this study, FTIR spectroscopy was employed to identify characteristic functional groups, and DSC was used to assess thermal behavior and purity. UV spectrophotometric analysis was further utilized to establish the λmax, construct calibration curves, and validate the developed method with parameters such as linearity, precision, and accuracy.[13-15]

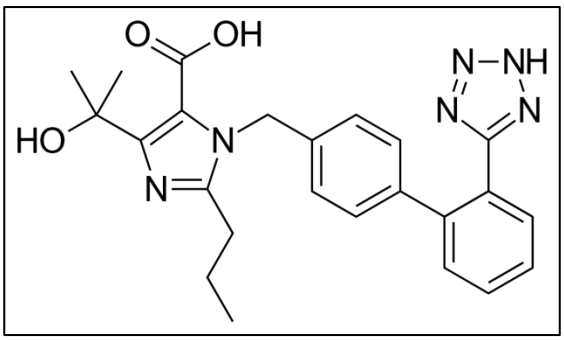

Figure 1: Structure of Olmesartan

Sacubitril Calcium, on the other hand, is a novel antihypertensive drug primarily used in the management of heart failure with reduced ejection fraction (HFrEF). It acts as a neprilysin inhibitor and is often co-formulated with valsartan as a part of the angiotensin receptor-neprilysin inhibitor (ARNI) class. Sacubitril inhibits the enzyme neprilysin, thereby increasing the levels of natriuretic peptides that promote vasodilation, natriuresis, and inhibition of renin and aldosterone secretion. As a relatively new therapeutic agent, Sacubitril demands comprehensive analytical evaluation for its stability, compatibility, and quantitative estimation in both pharmaceutical and biological environments. FTIR and DSC were used to characterize the drug's physicochemical profile and verify its structural and thermal properties. UV spectrophotometric analysis was carried out to determine its λmax and linear concentration range, followed by method validation as per ICH guidelines.[16-20]

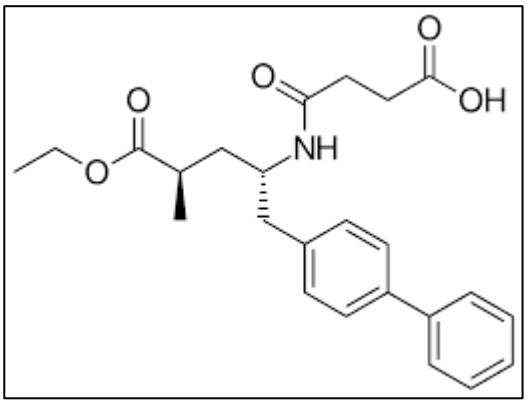

Figure 2: Structure of Sacubitril

In the present research, a UV spectrophotometric method has been developed and validated for the simultaneous estimation of Olmesartan Medoxomil and Sacubitril Calcium in pharmaceutical formulations. The method was validated in accordance with ICH Q2(R1) guidelines, covering crucial parameters such as specificity, linearity, accuracy, precision, limit of detection (LOD), and limit of quantification (LOQ). The analytical method development was further supported by FTIR spectroscopy and DSC studies, which provided insights into the chemical structure, functional groups, and thermal stability of both drugs. The combined analytical approach ensures that the method is not only simple and cost-effective but also accurate and reproducible for routine quality control and preformulation studies.[21-24]

This comprehensive analytical study aims to contribute significantly to the pharmaceutical sciences by offering a validated UV method supported with physicochemical characterization for two important antihypertensive drugs. Such integrative approaches help ensure the quality, safety, and efficacy of pharmaceutical products and pave the way for further bioanalytical and pharmacokinetic investigations.

2. MATERIAL AND METHODS:

Material:

Pure drug samples of **Sacubitril Calcium** were provided by Dhamtec Pharma and Consultants, Taloja, Navi Mumbai-410208 and **Olmesartan Medoxomil** were kindly provided by **Sun Pharmaceutical Industries Ltd., Mumbai, India**. **Methanol**, **ethanol**, and other analytical grade reagents were procured from **Merck Life Science Pvt. Ltd., Mumbai, India**. **Potassium bromide (IR grade)** for FTIR analysis was obtained from **Sigma-Aldrich, India**. **FTIR spectra** were recorded using a **Shimadzu IR Affinity-1 spectrophotometer**, while **DSC analysis** was performed using a **Shimadzu DSC-60 instrument**. UV absorbance measurements were carried out using a **Shimadzu UV-1800 double-beam spectrophotometer** with 1 cm quartz cuvettes. All glassware used was of **borosilicate quality** from **Borosil Glass Works Ltd., Mumbai, India**, and

standard laboratory equipment such as an analytical balance, sonicator, and pH meter were used as per standard protocols.

FTIR Analysis[25-28]

The Fourier Transform Infrared (FTIR) spectroscopic analysis was carried out to determine the characteristic functional groups and confirm the chemical integrity of Olmesartan Medoxomil and Sacubitril Calcium. A small amount of each pure drug (approximately 2–3 mg) was accurately weighed and mixed thoroughly with IR-grade potassium bromide (KBr) in a ratio of 1:100 (sample:KBr) using a mortar and pestle. The homogenous powder blend was then compressed into a thin, transparent pellet using a hydraulic press under vacuum. The prepared pellet was placed in the sample holder and scanned in the 4000–400 cm^{-1} range using a Shimadzu IR Affinity-1 spectrophotometer. The resulting spectra were analyzed to identify characteristic peaks corresponding to different functional groups present in the drugs, thereby confirming their identity and structural stability.

DSC Analysis[29-31]

Differential Scanning Calorimetry (DSC) was performed to evaluate the thermal behavior, melting point, and crystalline nature of the selected drugs. Approximately 2–5 mg of accurately weighed drug sample was placed in a standard aluminum pan and hermetically sealed. An empty aluminum pan was used as a reference. The analysis was conducted using a Shimadzu DSC-60 instrument, calibrated with indium. The samples were heated from 30°C to 300°C at a rate of 10°C/min under a continuous flow of nitrogen gas (50 mL/min) to provide an inert atmosphere. The thermograms obtained were examined for endothermic and exothermic peaks, which provided insight into the drug's melting point, purity, and any possible polymorphic transitions or degradation.

Determination of λ max [32-41]

The standard solution of Olmesartan Medoxomil and Sacubitril Calcium was scanned in the wavelength range of 200-400 nm on a UV-Visible Spectrophotometer from this, wavelength corresponding to maximum absorbance (λ max) respectively.

Construction of Calibration Curve[42-48]

Standard solution was prepared by accurately weighed 10 mg of Olmesartan Medoxomil and 10 mg of Sacubitril Calcium working standard into a 10 ml volumetric flask separately, added Methanol : Water (80:20) for both drugs, shake and sonicated to dissolve the content, made up the volume with same diluent and filtered through 0.45 micron membrane filter. The solution was further diluted with solvent mixture system to obtain the required concentration of standard solution (4-20 µg/ml) for Olmesartan Medoxomil and (1-9 µg/ml) for Sacubitril Calcium respectively.

Instrument Used:

Lasany, Model LI-2702 UV/Visible double beam spectrophotometer, with pair of matched quartz cells corresponding to 1 cm path length was used for measurement of absorbance. Elder digital balance used for weighing, ultra sonicator of prama instrument was used for sonicating the drug and sample solution.

UV Method Development[49-58]

Selection of Common Solvents

Solubility study was carried out with a view to find a suitable solvent in which the drug is completely soluble and stable. Solvents like distilled water, ethanol, methanol, acetonitrile, phosphate buffer and its combinations were tried for checking solubility of Olmesartan Medoxomil and Sacubitril Calcium. After assessing the solubility of drug in different solvent system Methanol: Water (80:20) has been selected and finalized as common solvent to observe spectral characteristics.

Various concentrations of Olmesartan Medoxomil and Sacubitril Calcium

Various dilutions of Olmesartan Medoxomil and Sacubitril Calcium from the standard solutions were prepared for the Olmesartan Medoxomil(4,8,12,16and 20 µg/ml) standards prepared whereas, for the Sacubitril Calcium (1,3,5,7and 9 µg/ml) were prepared by using Methanol: Water (80:20) at the observed fixed wavelength.

Method validation:

Linearity Study:

Linearity was studied by preparing serial dilutions using standard stock solution in 10 ml volumetric flask. I.C.H. recommends that for the establishment of linearity, a minimum of 5 concentrations normally used. The various dilutions used for linearity study are as follows and the further study was carried out.

B. Accuracy:

The solutions prepared i.e., 80%, 100% and 120% solutions were injected into the column. The amounts added and amounts estimated for Olmesartan Medoxomil and Sacubitril Calcium and the individual recovery and mean recovery values were calculated.

% RC= [SPS-S/SP] × 100

Where, SPS= Amount found in the spiked sample

S= Amount found in the sample

SP= Amount added to the sample

% RC= Percent recovery

C. Precision:

Intra- and inter-day precision of the method was established at three concentration levels. Intra-day precision was established by preparing nine different solutions of 4 µg/ml, 12 µg/ml, 20 µg/ml for Olmesartan Medoxomil and 1 µg/ml, 5µg/ml and 9 µg/ml for Sacubitril Calcium respectively and its analysis at morning, afternoon and evening time. Deviation in results in terms of % relative standard deviation (% RSD) was calculated. Inter-day precision of Olmesartan Medoxomil and Sacubitril Calcium was established by analyzing the above mentioned solutions at three consecutive days.

D. Robustness:

Robustness of the method was evaluated by changing the solvents. Three different solvents viz. Methanol: Water (70:30), Phosphate buffer (pH 5.8): Acetonitrile (60:40) and Phosphate buffer (pH 5.8): Methanol (60:40), were used for dissolving Olmesartan Medoxomil and Sacubitril Calcium and the absorbance of each was determined. Olmesartan Medoxomil and Sacubitril Calcium levels in each sample were estimated using pre-defined calibration curve. Results were represented in terms of % RSD.

E. Ruggedness:

Ruggedness of the method was determined by carrying out the analysis of Olmesartan Medoxomil and Sacubitril Calcium solutions (8 µg/ml for Olmesartan Medoxomil and 3 µg/ml for Sacubitril Calcium) at three different (25°C, 37°C and 60°C) temperatures and absorbance were noted and % RSD was calculated.

F. LOD and LOQ:

Limit of detection (LOD) is the lowest amount of an analyte that can be detected but not necessarily as an exact value. Limit of quantification (LOQ) is the lowest amount of an analyte in a sample that can be quantitatively determined with suitable precision and accuracy. The LOD and LOQ were separately determined which is based on calibration curve. The S.D. of y intercept of regression line may be used as S.D. The given concentration was used for this and the absorbance was taken and then calculates the standard deviation and slope.

3. RESULTS AND DISCUSSION:

FTIR Spectra of Olmesartan Medoxomil:

The FTIR spectrum of Olmesartan Medoxomil confirms the presence of key functional groups corresponding to its chemical structure. A broad peak observed around 3587.60 cm-1 and 3406.29 cm-1 indicates overlapping -OH and N-H stretching vibrations, suggesting the presence of hydrogen bonds. The sharp and intense peak near 1720.50 cm-1 corresponds to the C=O stretching of the ester and ketone groups, confirming the presence of carbonyl functionalities. Multiple peaks in the region 1464.68 cm-1 are attributed to C=C stretching of the aromatic ring, indicative of its benzene structure. The absence of unexpected peaks or significant shifts in characteristic frequencies serves to confirm the stability and purity of Olmesartan Medoxomil. In summary, the FTIR analysis validates the chemical structure, functional group integrity, and potential for formulation development without degradation or impurity interference.

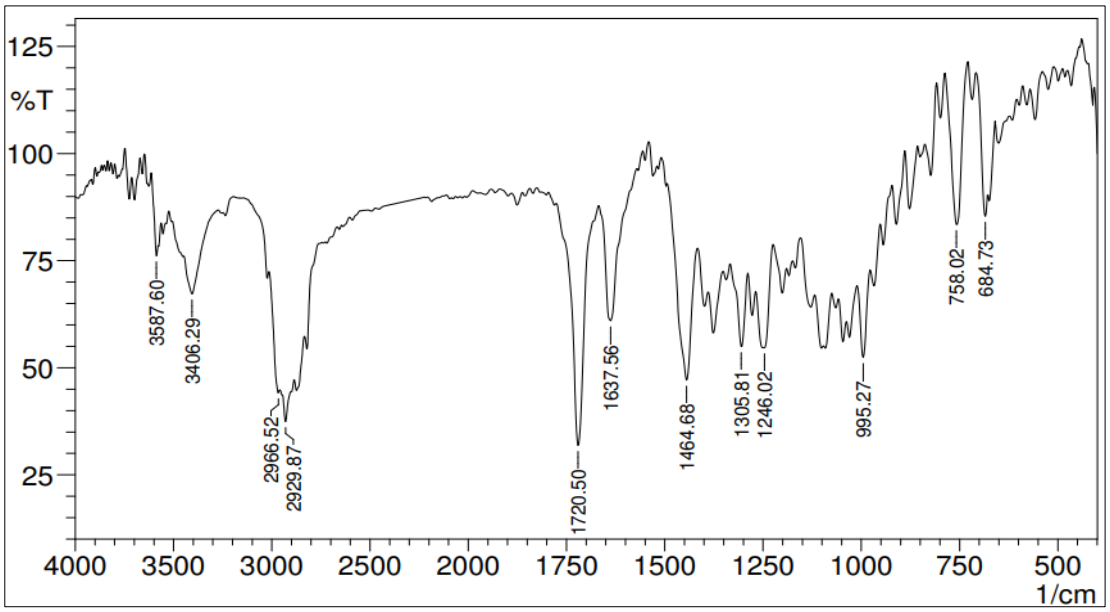

Figure 3: FTIR Spectra of Olmesartan Medoxomil

DSC Thermogram of Olmesartan Medoxomil

The DSC of the Olmesartan Medoxomil was carried out by using instrument. The DSC thermogram of Olmesartan Medoxomil shows sharp exothermic peak at 177.18°C corresponding to its melting point 175-178°C.

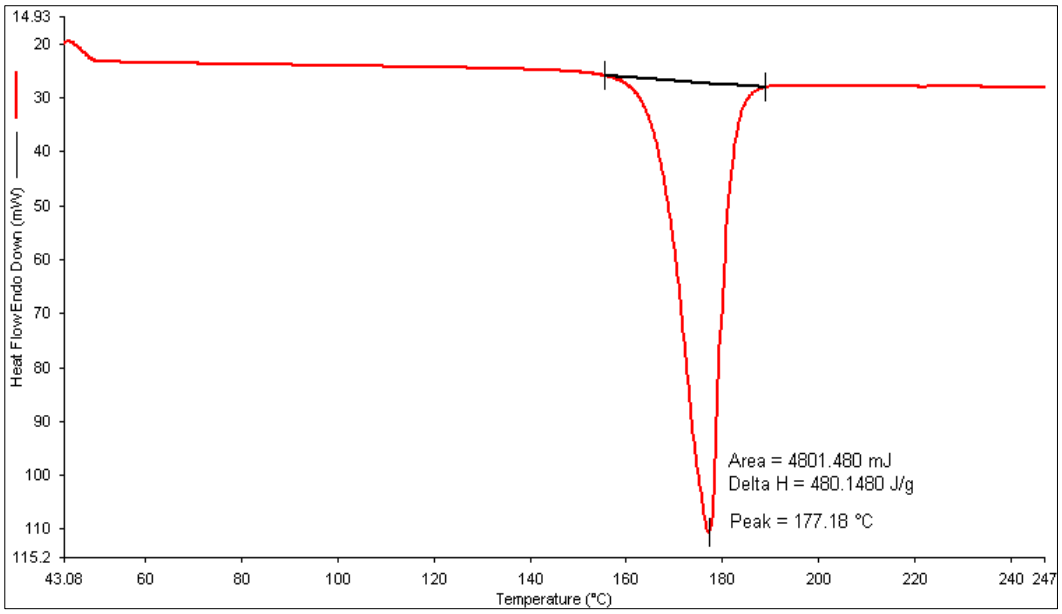

Figure 4: DSC Thermogram of Olmesartan Medoxomil

FTIR Spectra of Sacubitril Calcium

The FTIR spectrum of Sacubitril Calcium confirms the presence of functional groups critical to its structure and pharmacological activity. A broad absorption band observed around **3467.09 cm⁻¹** indicates the presence of **-OH (alcohol or phenolic)** groups, likely involved in hydrogen bonding. The sharp and intense peak at **1655.28 cm⁻¹** corresponds to **C=O stretching,** confirming the presence of ester and ketone groups. Peaks in the **1500–1580 cm⁻¹** region are associated with **C=C aromatic stretching,** validating the aromatic components of the molecule. The characteristic **C-O-C stretching** peak near **1296.16, 1263.37 cm⁻¹** supports the presence of ester linkages, while a weak peak around **557.43 cm⁻¹** corresponds to the **Ca-O bond,** confirming the calcium ion's coordination within the structure. The absence of unexpected peaks or significant shifts suggests that the structure of Sacubitril Calcium is intact, confirming its purity and stability under the conditions tested.

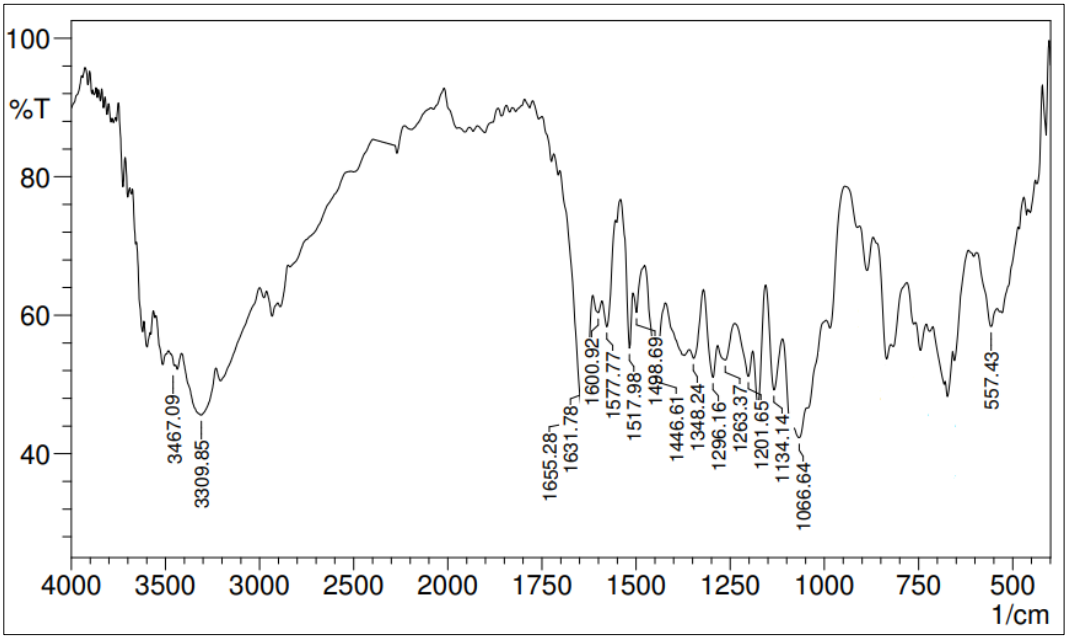

Figure 5: FTIR Spectra of Sacubitril Calcium

DSC Thermogram of Sacubitril Calcium

The DSC of the Sacubitril Calcium was carried out by using instrument. The DSC thermogram of Olmesartan Medoxomil shows sharp exothermic peak at 156.96°C corresponding to its melting point greater than 140°C.

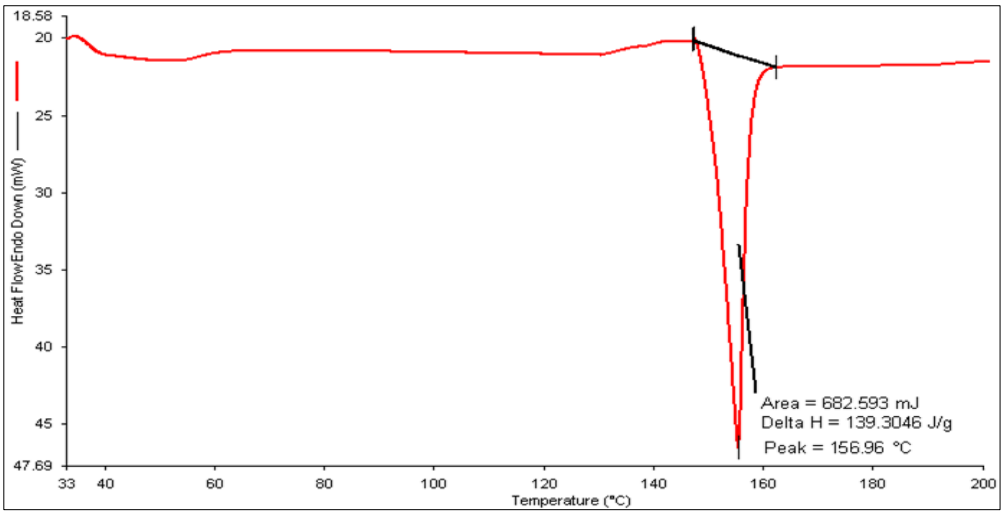

Figure 6: DSC Thermogram of Sacubitril Calcium

UV analysis:

Determination of λmax:

The determination of the maximum absorption wavelength (λmax) for Olmesartan Medoxomil and Sacubitril Calcium was conducted using a UV-visible spectrophotometer to identify the wavelength at which each drug exhibits maximum absorbance. Standard stock solutions of both drugs were prepared in Methanol: Water (80:20) and diluted to obtain a 10 µg/mL working solution. The solutions were scanned in the 200–400 nm range, and the λmax values were recorded. Olmesartan Medoxomil demonstrated maximum absorbance at approximately 255 nm, while Sacubitril Calcium exhibited a λmax at 254 nm. The selected λmax was further used for method development in RP-HPLC, ensuring optimal sensitivity and accuracy in drug quantification.

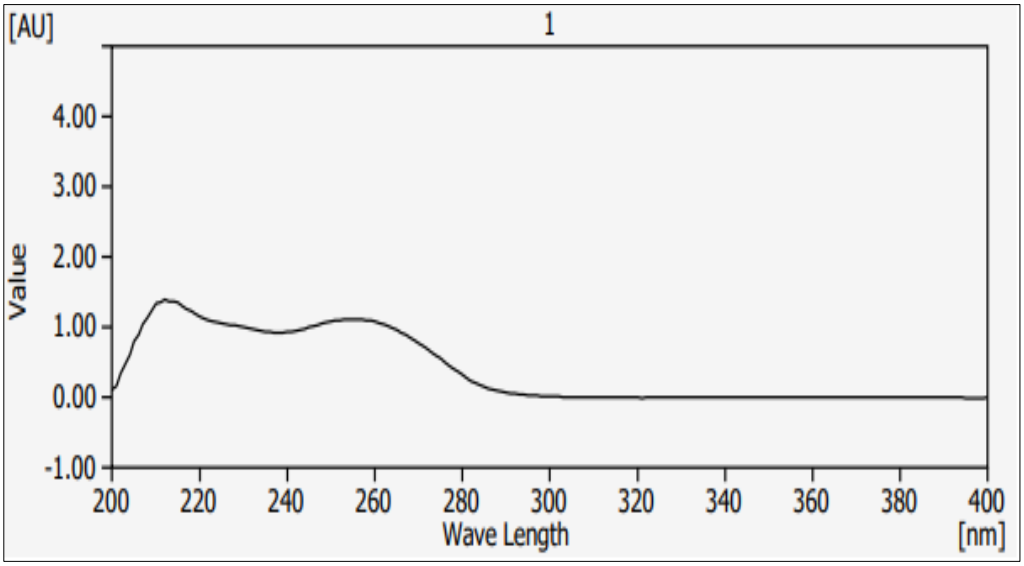

Figure 7: Maximum wavelength detection of Olmesartan Medoxomil

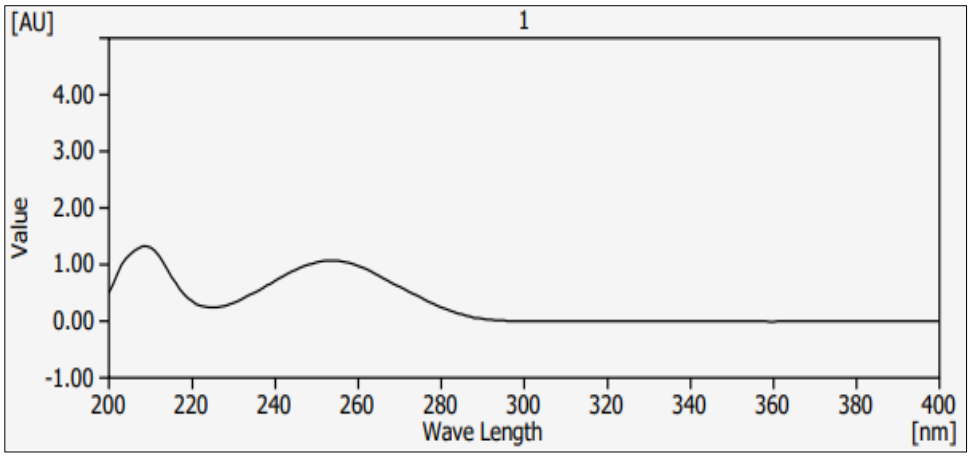

Figure 8: Maximum wavelength detection of Sacubitril Calcium

Development of standard curve for the Olmesartan Medoxomil and Sacubitril Calcium

Olmesartan Medoxomil

The calibration curve of Olmesartan Medoxomil was performed and graph plotted concentration vs. absorbance. The absorbance values of different concentration were noted. The regression equation was found to be y = 0.046x+0.0272, with R^2 value of 0.9996. The graph was found to be linear.

Table 1: Concentration range and respective absorbance of Olmesartan Medoxomil

Sr.No.	Concentration (ppm)	Absorbance
1	4	0.215
2	8	0.389
3	12	0.583
4	16	0.755
5	20	0.951

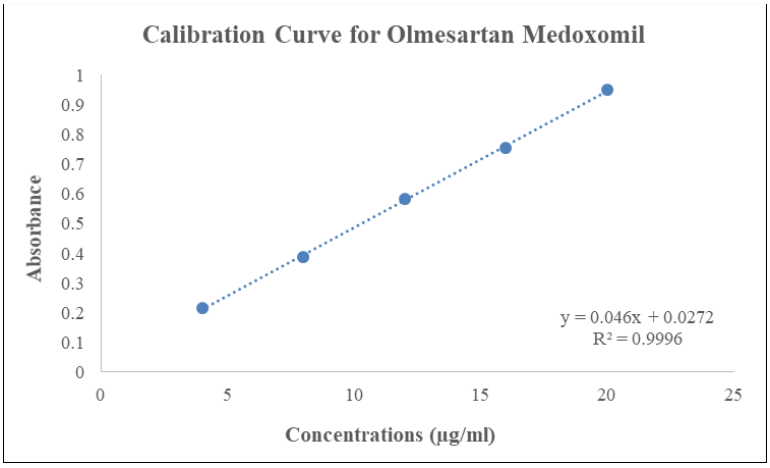

Figure 9: Standard Curve for Olmesartan Medoxomil

Sacubitril Calcium

The calibration curve of Sacubitril Calcium was performed and graph plotted concentration vs. absorbance. The absorbance

values of different concentration were noted. The regression equation was found to be y = 0.1164x+0.0271, with R^2 value of 0.9995. The graph was found to be linear.

Table 2: Concentration range and respective absorbance of Sacubitril Calcium

Sr No.	Concentration (ppm)	Absorbance
1	1	0.149
2	3	0.374
3	5	0.596
4	7	0.851
5	9	1.074

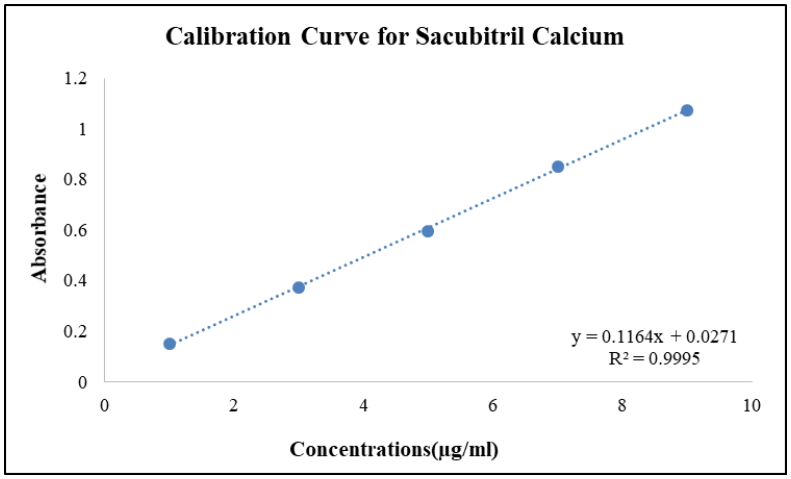

Figure 10: Standard Curve for Sacubitril Calcium

METHOD VALIDATION FOR UV METHOD DEVELOPMENT:

Linearity

For the linearity of the Olmesartan Medoxomil five point calibrations curve were plotted in a concentration range of 4-20 µg/ml. The equation was found to be y = 0.046x+0.0272, with correlation coefficient of 0.9996 Whereas, Sacubitril Calcium five point calibrations curve were plotted in a concentration range of 1-9 µg/ml. Linear regression equation was y = 0.1164x+0.0271 with correlation coefficient 0.9995. From the linearity study it was observed that the drug was found to be linear in the concentration range.

Accuracy

Accuracy of the proposed UV method for Olmesartan Medoxomil and Sacubitril Calcium was verified by conducting the recovery studies by using standard addition method. Standard drug concentration at three different percent levels was added to known amount of Olmesartan Medoxomil and Sacubitril Calcium. The percent recovery of added standards was calculated showed in the table. The results showed better % mean recovery for respective percent levels. The % mean recovery values are closer to 100% showed high accuracy of the proposed UV analytical method.

Table 3: Accuracy study of Olmesartan Medoxomil and Sacubitril Calcium

	Olmesartan Medoxomil				
Concentration (%)	**Origin level (µg/ml)**	**Amount added (µg /ml)**	**% Recovery**	**Mean % Recovery**	**% RSD**

80	4	3.2	99.07	100.62	1.412
80	4	4	100.93		
80	4	4.8	101.86		
100	12	9.6	99.31	100.00	0.618
100	12	12	100.51		
100	12	14.4	100.17		
120	20	16	100.53	100.04	0.438
120	20	20	99.68		
120	20	24	99.89		
	Sacubitril Calcium				
Concentration (%)	**Origin level (µg/ml)**	**Amount added (µg/ml)**	**% Recovery**	**Mean % Recovery**	**% RSD**
80	1	0.8	101.34	100.23	1.394
80	1	1	98.66		
80	1	1.2	100.67		
100	5	4	99.16	99.38	0.703
100	5	5	100.17		
100	5	6	98.83		
120	9	7.2	100.84	100.71	0.474
120	9	9	100.19		
120	9	10.8	101.12		

Precision

Intra-day and inter-day precision study of drug were evaluated for the 4 µg/ml, 12 µg/ml and 20 µg/ml for Olmesartan Medoxomil and 1 µg/ml, 5 µg/ml and 9 µg/ml for Sacubitril Calcium. Absorbance mean, percent assay and percent RSD were calculated for the intra-day as well as inter-day precision study

Table 4: Intra-day and Inter-day study of Olmesartan Medoxomil

Intra-day	**Morning**			**Afternoon**			**Evening**		
Concentration Range (µg/ml)	Mean	% Assay	% RSD	Mean	% Assay	% RSD	Mean	% Assay	% RSD
4	0.216	99.23	0.960	0.213	101.87	1.692	0.209	98.74	1.44
12	0.582	100.17	0.619	0.581	99.36	0.813	0.577	99.48	0.624
20	0.952	99.96	0.368	0.951	100.35	0.321	0.954	99.89	0.377
Inter-day	**Day 1**			**Day 2**			**Day 3**		
Concentration Range (µg/ml)	Mean	% Assay	% RSD	Mean	% Assay	% RSD	Mean	% Assay	% RSD
4	0.213	101.87	1.692	0.210	100.63	0.728	0.211	100.15	1.194

12	0.581	99.77	0.882	0.579	99.48	0.518	0.580	99.71	0.653
20	0.949	99.86	0.338	0.952	99.96	0.368	0.950	99.96	0.474

Table 5: Intra-day and Inter-day study of Sacubitril Calcium

Intra-day	**Morning**			**Afternoon**			**Evening**		
Concentration Range (µg/ml)	Mean	% Assay	% RSD	Mean	% Assay	% RSD	Mean	% Assay	% RSD
1	0.150	99.33	1.763	0.149	98.65	1.342	0.152	100.22	1.659
5	0.595	100.22	0.256	0.591	100.39	0.352	0.592	99.61	0.542
9	1.071	100.24	0.234	1.074	100.09	0.426	1.068	100.34	0.328
Inter-day	**Day 1**			**Day 2**			**Day 3**		
Concentration Range (µg/ml)	Mean	% Assay	% RSD	Mean	% Assay	% RSD	Mean	% Assay	% RSD
1	0.150	99.77	1.674	0.152	99.78	1.652	0.149	101.57	1.692
5	0.592	100.39	0.351	0.589	100.39	0.427	0.591	100.28	0.258
9	1.071	99.87	0.300	1.071	99.75	0.235	1.071	100.40	0.353

Robustness

Robustness study was evaluated by using three different solvent. The method was found to be robust as indicated by the % RSD values which are less than 2%.

Table 6: Robustness of Olmesartan Medoxomil and Sacubitril Calcium

Olmesartan Medoxomil			
Concentration (µg/ml)	**Solvents**	**Absorbance**	**% RSD**
8	Methanol: Water (70:30)	0.389	0.771
8	Phosphate buffer (pH 5.8): Acetonitrile (60:40)	0.384	0.150
8	Phosphate buffer (pH 5.8): Methanol (60:40)	0.391	0.643
Sacubitril Calcium			
Concentration (µg/ml)	**Solvents**	**Absorbance**	**% RSD**
3	Methanol: Water (70:30)	0.370	0.868
3	Phosphate buffer (pH 5.8): Acetonitrile (60:40)	0.372	0.820
3	Phosphate buffer (pH 5.8): Methanol (60:40)	0.373	0.863

Ruggedness

Ruggedness study of drug was carried out at the three different temperature levels. From the results it was found that the method was rugged showing the % RSD value less than 2%.

Table 7: Ruggedness of Olmesartan Medoxomil and Sacubitril Calcium

Olmesartan Medoxomil			
Concentration (µg/ml)	**Temperature (°C)**	**Absorbance**	**% RSD**
8	25	0.383	0.941
8	37	0.379	1.245
8	60	0.380	1.643
Sacubitril Calcium			
Concentration (µg/ml)	**Temperature (°C)**	**Absorbance**	**% RSD**
3	25	0.369	0.563
3	37	0.374	0.535
3	60	0.367	0.545

Limit of Detection (LOD) & Limit of Quantification (LOQ)

Form the results it was found that LOD & LOQ are in the sub-microgram level, which indicates the sensitivity of the method.

Table 8: Evaluation data for LOD & LOQ of Olmesartan Medoxomil and Sacubitril Calcium

Olmesartan Medoxomil	
LOD	0.113 µg/ml
LOQ	0.256 µg/ml
Sacubitril Calcium	
LOD	0.051 µg/ml
LOQ	0.123 µg/ml

4. CONCLUSION:

The present study successfully demonstrates a comprehensive analytical evaluation and validated UV spectrophotometric method for the simultaneous estimation of Olmesartan Medoxomil and Sacubitril Calcium, two clinically significant antihypertensive drugs. The FTIR spectral analysis of both drugs confirmed the presence of key functional groups such as hydroxyl, carbonyl, and aromatic functionalities, thereby verifying the structural integrity and chemical stability of the individual APIs. Additionally, DSC thermograms provided clear endothermic peaks corresponding to their respective melting points, further confirming the purity and thermal characteristics without any sign of decomposition or polymorphic transformation.

The UV spectrophotometric analysis yielded accurate λmax values for Olmesartan Medoxomil (255 nm) and Sacubitril Calcium (254 nm), which were used for calibration and quantification. The method showed excellent linearity with correlation coefficients (R^2) of 0.9996 and 0.9995 for Olmesartan Medoxomil and Sacubitril Calcium, respectively, over their respective concentration ranges. Method accuracy, established through recovery studies, demonstrated percent recoveries close to 100%, indicating the reliability and reproducibility of the method. Furthermore, intra-day and inter-day precision data confirmed the consistency of the absorbance values with low %RSD values, which remained well below the acceptable limit of 2%, thereby ensuring high precision. The developed method also exhibited high robustness and ruggedness across different solvents and temperatures, signifying its stability and applicability under variable analytical conditions. The LOD and LOQ values obtained were in the sub-microgram range, establishing the high sensitivity of the developed method.

In conclusion, the combined use of FTIR, DSC, and UV spectrophotometric techniques enabled a thorough analytical characterization and validation for both drugs. The developed UV method is simple, accurate, precise, cost-effective, and suitable for routine quality control analysis of Olmesartan Medoxomil and Sacubitril Calcium in pharmaceutical formulations. This study also lays a solid foundation for future bioanalytical and pharmacokinetic evaluations involving these antihypertensive agents.

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AUTHORS CONTRIBUTIONS:

All authors have contributed equally.

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All authors have declared no conflict of interest

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