SPECTROPHOTOMETRIC DETERMINATION OF CETILISTAT IN TABLETS

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***Abstract*: A simple, precise, rapid, novel and accurate spectrophotometric method has been developed and validated for the determination of Cetilistat in tablet formulation using methanol as the solvent at 222nm. Linearity was observed in the concentration range of 0.1-18µg/ml. The %recovery studies were carried out at three different levels and it was found to be 96.34%-103.92%w/w.The method was validated statistically as per ICH guidelines.**

Keywords: Cetilistat, Methanol, Spectrophotometry, Validation.

INTRODUCTION

Cetilistat, chemically 2-hexadecoxy-6methyl-3,1-benzoxazin-4-one with molecular formula $C_{25}H_{39}NO_3$ and molecular weight 401.6g/mol is used in the treatment of obesity[1,2]. Literature survey revealed few methods for determination of Cetilistat in bulk and in tablet formulation[3,4]. The present work describes the development and validation of accurate and precise Spectrophotometric method for determination of Cetilistat in tablets.

EXPERIMENTAL

Instruments and Materials

Standard Cetilistat is obtained from the company manufacturing the drug. The Shimadzu UV-Visible spectrophotometer 1700 and 1cm path length of quartz cells were used.

Materials and methods

Preparation of standard solution: 10mg of standard drug is weighed, dissolved in few ml of methanol and the volume was made upto 10ml mark with methanol, from this 0.05ml was pipetted out and volume was made upto 10 mark with methanol to get 5µg/ml. This solution was scanned over the UV range of 200-400nm and it is observed that the solution showed maximum absorbance at 222nm and hence it is selected as the wavelength for detection.

Validation of analytical method

1. Linearity

The linearity for Cetilistat was found to be in concentration range of 0.1-18µg/ml. The co-efficient of correlation was found to be R^2=0.9986 (Table 1)

2. Precision

Precision measures how closely test results from different samples of a homogenous sample coincide when the process is conducted repeatedly. The standard deviation or relative standard deviation is typically used to express precision. The devised technique was validated for method, system, inter-day, and intra-day precision in the current study.
Both the method and the system offer good accuracy and reproducibility as the results of %RSD for all precision studies were within the acceptable range (Not more than 2%). (Table 1)

3. LOD and LOQ:

The detection limit of an individual analytical procedure is the lowest amount of analyte in a sample which can be detected but not necessarily quantified as an exact value.
The quantification limit of an individual analytical procedure is the lowest amount of analyte in a sample which can be quantitatively determined with suitable precision and accuracy.
LOD and LOQ were calculated using following formula,

$$\textbf{LOD} = 3.3 \times \frac{\text{Standard deviation of Y-intercept}}{\text{Slope of calibration curve}}$$

$$\textbf{LOQ} = 10 \times \frac{\text{Standard deviation of Y-intercept}}{\text{Slope of calibration curve}}$$

4. Accuracy

To check the accuracy of the proposed method, recovery studies were carried out at three different levels i.e 80 %, 100 % and 120 %. The standard bulk drug was added at 3 different levels to the preanalyzed sample solution and then reanalysed and the percentage recovery was determined.(Table 2)

5. Sensitivity:

Absorbance of standard solution was measured at 222nm. Sandell's sensitivity for drug solution was calculated from formula,

$$\text{Sandell's sensitivity} = \frac{\text{Conc. of drug } (\mu g 100\ mL^{-1}) \times 0.001}{\text{Absorbance}}$$

The Sandell's sensitivity was found to be 0.00009900 μgcm^{-3}

Analysis of Cetillistat in tablets

Brand: KILFAT
Lable claim: 60mg of Cetilistat
Brand company: AKUMENTIS

Procedure: 10 tablets were accurately weighed and powdered finely. Tablet powder equivalent to 10mg of Cetilistat was weighed and trasferred into 10ml volumetric flask, few ml of methanol was added and sonicated for 15min and the volume was made upto 10ml mark with methanol. From this an aliquot of 0.05ml was transferred into different 10ml volumetric flask and the volume was made upto the mark to obtain the concentration of 5µg/ml of Cetilistat solution. The solution was filtered using 0.45µ membrane filter. The absorbance of solution was determined at 222nm and the concentration of cetilistat in the sample solution was determined from the calibration curve by using regression analysis.

$$\%ASSAY = \frac{\text{absorbance of sample} \times \text{concentration of standard} \times DF \times 100}{\text{absorbance of standard} \times \text{weight of sample} \times \text{label claim}}$$

Dilution factor= 2000

Results and Discussion

Cetilistat is used to treat obesity, displayed its greatest absorption at 222 nm (Fig. 1). In the concentration range of 0.1-18µg/ml linearity was observed. The %recovery at three different levels was found to be 96.34-103.92%w/w. The approach was accurate and exact as evidenced by the %RSD being less than 2. With regard to Sandell's sensitivity, the approach was discovered to be sensitive. It was discovered that the developed procedure was linear, accurate, specific, and reproducible.

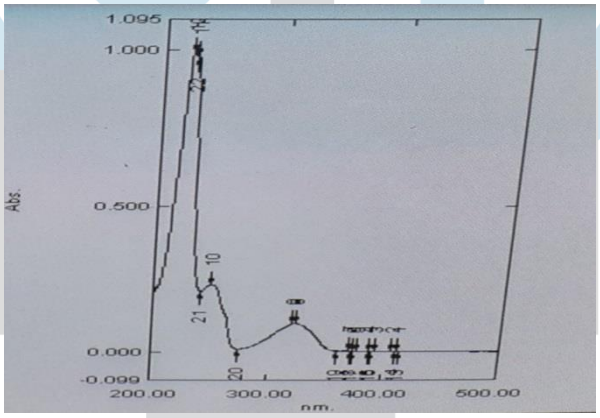

Fig 1: Spectra of Cetilistat (5µg/ml) in methanol

Table 1: Validation paramaters for Cetilistat

Parameters	Cetilistat data
Linearity	0.1-18µg/ml
Regression coefficient (R^2)	0.9986
LOD(µg/ml)	0.3443
LOQ(µg/ml)	1.0435
Method Precision (%RSD)	0.1922
System Precision (%RSD)	0.3663
Interday (%RSD)	0.54745
Intraday (%RSD)	0.5396
Sandelle's Sensitivity (μgcm^{-3}/AU)	0.00009900
Assay (%w/w)	99.68-100.1%w/w

Table 2: Recovery studies for Cetilistat at three different levels

Sl.No	Conc of STD (µg/ml)	Conc of Sample (µg/ml)	Total Conc(A+B) (µg/ml)	Abs for mixture (STD +Sample)	Total amount(A+B) (µg/ml)	Recovery of STD (µg/ml)	%Recovery of STD (%w/w)
1	4	5	9	0.891	8.881	3.88	97.04%
2	5	5	10	0.982	9.817	4.81	96.34%
3	6	5	11	1.12	11.235	6.235	103.92%

Conclusion

A Spectrophotometric method has been developed for the determination of Cetilistat in tablet formulation. The method was validated based on ICH analytical method validation guidelines[5]. The method was found to be accurate, linear, precise and reproducible. Hence the method can be used for routine analysis of of Cetilistat in bulk and in tablet formulation.

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References

1. https://pubchem.ncbi.nlm.nih.gov
2. Padwal R, Li SK, Lau DC . Long-term pharmacotherapy for overweight and obesity: a systematic review and meta-analysis of randomized controlled trials. Int. J. Obes. Rel. Metab. Disord. 2003, 27 , 1437–1446.[Crossref],[PubMed],[Web of Science ®]
3. Kalshetti MS and Jalkote RN . A simple Validated UV Spectrophotomeric Method for Quantitative Analysis of Cetilistat in Pharmaceutical Dosage form . Int. J. Pharm. Med. Res. Tech 2019 8(5),725- 735
4. Kshirsagar SA, Mane SB, Hanchate YS, Katte AS . UV Specroscopic method Development and Validation for Determination of Cetilistat in API and in pharmaceutical Dosage form . Int. J. Pharm. Res. Schl 2018,7(1)1-8
5. International Conference on Harmonization , Q2(R1), Harmonized tripartite guidelines, Validation of analytical procedures: text and methodology ,Geneva, November 2005