EXECUTIVE SUMMARY

UGC MINOR PROJECT

Grant Details

F. No.: FILE NO:47-869/13(WRO) dated :17/10/2014

Title: Development and Validation of Stability- Indicating Assay Methods (SIAMs) For Drug Substance and Product.

Principal Investigator: Prof. A. S. Tapkir

Duration: 2015-2017 (Two Years)

College: P E Society's Modern College of Pharmacy, Nigdi, Pune 411044.

Effective date of starting the period: 11/02/2015

Total Grant Approved: Rs. 3,20,000 /-

SUMMARY OF THE RESEARCH PROJECT:

In the present research work, Development and validation of stability-indicating assay methods (SIAMs) was performed for Sitagliptin phosphate in bulk and formulation. In this sense Forced degradation plays a key role not just in the development of stability-indicating methods, but also in providing useful information about the degradation pathways and degradation products that could form during storage. The information thus obtained will facilitate pharmaceutical development in areas such as formulation development, manufacturing, and packaging, where knowledge of chemical behavior can be used to improve the quality of drug product. Forced degradation on the drug substance and product will (in addition to establishing specificity) also provide the following information:

1. Determination of degradation pathways of drug substances and drug products
2. Discernment of degradation products in formulations that are related to drug substances versus those that are related to non-drug substances (e.g. excipients)
3. Structure elucidation of degradation products
4. Determination of the intrinsic stability of a drug substance molecule in solution and solid state.

- **UV Method:** Development and validation of stability indicating assay method by using UV visible method for estimation of Sitagliptin phosphate bulk drug was done by using Jasco V-630UV-visible spectrophotometer.

Concentration range was found to be 50-250 µg/ml in which drug obeyed Beer-Lambert's law. The correlation was found to be 0.998. The recovery study was carried out by preparing solution of 80% 100% 120% and get recovery between 98-102%. The precision study was carried out and % RSD was found to be 0.86 and 0.25 % which is less than 2%. Robustness of the method was determined by carrying out the analysis under different temperature condition and the % RSD was found to be 0.3655% Ruggedness of the method was determined by carrying out the analysis by different instrument and the % RSD was found to be 0.5893%. LOD and LOQ were got the value 13.2 ppm and 39.4 ppm respectively.

- **HPLC Method:** An attempt was made to develop simple, accurate and Precise HPLC method for estimation of Sitagliptin Phosphate bulk drug by Water HPLC system, The mobile phase was prepared mixing 0.02M Phosphate buffer: ACN (60: 40 v/v), filtered through 0.45µ membrane filter paper and then sonicated on ultra sonic water bath for 30 min. Calibration curve was plotted as Peak area Vs Concentration. This straight line obeyed linearity in the concentration range of 50-250 µg/ml. recovery was found between 98-102%. Precision was found to be 0.57% and 1.00% LOD and LOQ was found to be 7.022 µg /ml and 21.27µg /ml respectively.

Stability studies of bulk drug were carried out by placing the drug in different stress condition. The acidic degradation alkaline degradation, oxidative degradation was found to be 15.41%, 19.98%, 15.08% respectively. No change in peak area or peak shape indicates in dry heat and photo degradation condition.

An attempt was made to develop simple, accurate and Precise HPLC method for estimation of Sitagliptin phosphate tablet by water HPLC system, using mobile phase 0.02M Phosphate buffer:ACN (60:40v/v). Calibration curve was plotted as Peak area Vs. Concentration This straight line obeyed linearity in the concentration range of 50-250 µg/ml. recovery was found between 98-102%.Precision was found to be 0.67% and 1.25%.LOD and LOQ were found to be 11.35 µg /ml and 34.40µg /ml respectively.

Stability studies of tablet were carried out by placing the drug in different stress condition. The acidic degradation alkaline degradation, oxidative degradation was found to be 15.48%, 18.45%, 15.49% respectively. No change in peak area or peak shape indicate in dry heat and photo degradation condition.

- **HPTLC Method:** An attempt was made to develop simple, accurate and Precise HPTLC method for estimation of Sitagliptin phosphate bulk drug by wincat software. The mobile phase was selected as Ethyl Acetate:methanol:formic acid (8.5:1:0.5v/v) on basis of polarity of drug.

This straight line obeyed linearity in the concentration range of 500-2500 ng/band. Recovery was found between 98-102 %. Precision % RSD was found to be 1.13% and 1.19% .LOD and LOQ were 124.36 ng/band and 376.87ng/band.

Stability studies of bulk drug were carried out by placing the drug in different stress condition. The acidic degradation, alkaline degradation, oxidative degradation was found to be 20.06%, 17.45%, 16.12% respectively. No change in peak area or peak shape indicates in dry heat and photo degradation condition.

Hence this study is concluded that, Sitagliptin phosphate is stable in dry heat and photo degradation condition and may little chances to degrade in acidic degradation, alkaline degradation and oxidative degradation.

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Principal Investigator