

Effect of Acid Base on Nifedipine by using UV Spectrophotometer

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Abstract

The aim of the study is to evaluate the effect of different environmental conditions by subjecting the pharmaceutical formulation i.e. Nifedipine under acidic and basic conditions by using spectrophotometer. It is usually preferred over other methods because of less equipment cost and economical maintenance advantage. The result reveals that the drug is degraded more in acidic medium as compared to basic medium. The absorbance of solution was decreased when subjected to acidic medium and when the solution was subjected to alkaline medium the absorbance decreases many folds as compared to acidic medium. In acidic medium the percent availability of the drug was 21.79% and in alkaline medium the percent availability was 7.26%. We conclude that the drug shows degradation in both the mediums.

Key Words: Acidic and basic medium, Nifedipin, spectrophotometers and degradation.

Introduction

Chemically Nifedipine is a dihydropyridine as shown in Fig-1; it is a calcium channel blocker that blocks L-type calcium channels.[1] The drug is approved for the use for the long-term treatment of hypertension and angina pectoris.[2] Nifedipine is used as tocolytic agent that delays premature labor. A review has concluded that this drug is comparable with magnesium sulfate and beta-agonists with fewer side-effects.[3] Raynaud's phenomenon is often treated with this drug. [4] Topical nifedipine has been shown to be as effective as topical nitrates for anal fissures.[5] The pharmacokinetics and pharmacodynamics of this drug have been investigated in various studies [6-8]. According to the Biopharmaceutics Classification System (BCS), this drug belongs to Class II compound with low solubility and high permeability [9]. Nifedipine shows high absorption rates from the colon and small intestine.[10].

The aim of the study is to evaluate the effect of different environmental conditions by subjecting the pharmaceutical formulation i.e. Nifedipine under acidic and basic conditions by using spectrophotometer. It is usually preferred over other methods because of less equipment cost and economical maintenance advantage. We have this type of assay for different drugs which are useful for pharmacist[11-20].

EXPERIMENTAL

Material and reagents

Pyrex glass wares were used which includes measuring cylinder, beakers, pipette, funnel, stirrer and volumetric flask. For initially washing of glass wares we use chromic acid afterward we use water and finally rinsed with double distilled or DI water (freshly prepared). Analytical grade reagents were used which includes 0.1N Sodium hydroxide, 0.1N Hydrochloric acid and de-ionized water or double distilled water and the tablets of different brands of Nifedipine.

Instruments

UV-visible Spectrophotometer with a quartz cuvette (Ultraviolet Lamp: Serial NO: N 045571, LF-204.LS, '4W-254 and 365 nm', T80 UV-VI spectrometer) 'PG Instrument', Weighing Balance (Item PA214C) of Pioneer OHAIUS, and Water Bath with 'HH-4' (digital and constant temp tank.)

Preparation of 0.1 N Sodium hydroxide and Hydrochloric acid

4 grams of sodium hydroxide was transferred in 100ml volumetric flask and was dissolved in small quantity of water and finally the volume was made up to mark of the flask with de-ionized water.

8.3ml analytical grade hydrochloric acid having 37% purity and 12N normality was transferred in a volumetric flask and the final volume was made up to the mark of flask with DI water.

Preparation of solution of different brands of Nifedipine

All the content of Nifedipine capsules was emptied. The required amount of the powder material was weighed on the weighing balance to prepare the solution of 200ppm equivalent to 20 mg of Nifedipine and was dissolved in small quantity of DI water for making the solution. Finally the volume was made up to the mark with de-

ionized water. shake for even distribution. The absorbance of solutions of ppm was determined by using UV-Visible spectrophotometer, at wavelength max of 234nm.

Procedure for Studies:

To determine the effect of acid and base on Nifedipine, 5 ml of 200 ppm solution of Nifedipine was transferred in to two separate test tubes then 5 ml of 0.1 N hydrochloric acid was added in one test tube and 5 ml of 0.1 N sodium hydroxide was added in another test tube respectively. Then the tubes were left for 30 minutes. The absorbance of the solution was determined using spectrophotometer at wavelength max 234nm.

Result and discussion:

The main objective of this study is to determine the effect of acidic and basic medium on the drug Nifedipine. For this reason we prepared a 200ppm solution of Nifedipine. To determine the effect of acid and base on Nifedipine the 200 ppm solution of Nifedipine was transferred in to two separate test tubes that contain 5ml of acid HCl and base NaOH separately. Then the tubes were left for 30 minutes. The absorbance of the solution was determined using spectrophotometer at wavelength max 234nm. The result reveals that the drug is degraded more in acidic medium as compared to basic medium. The absorbance of solution was decreased to 0.129 when subjected to acidic medium and when the solution was subjected to alkaline medium the absorbance decreases many folds as compared to acidic medium. In alkaline medium the absorbance was found to be 0.043. In acidic medium the percent availability of the drug was 21.79% and in alkaline medium the percent availability was 7.26%.

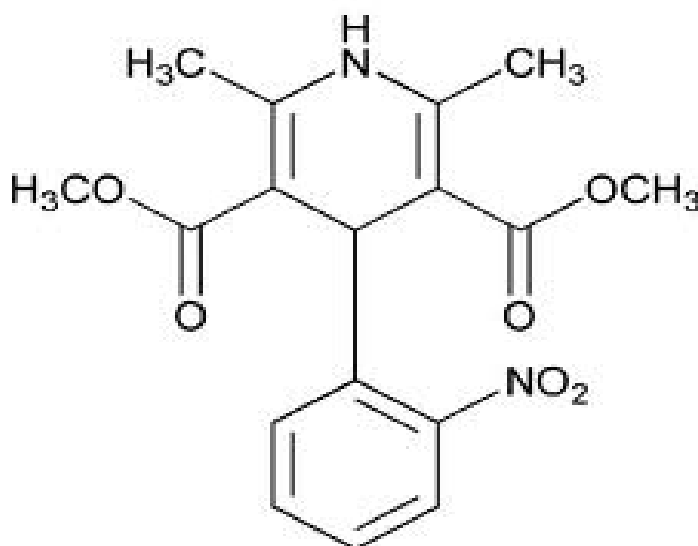


Fig-1 Structure of Nifedipine

Table-1 Percent Availability of Nifedipine in Acid and Base

Medium	Absorbance	Percent Availability
Standard	0.592	100%
Acid	0.129	21.79%
Base	0.043	7.26%

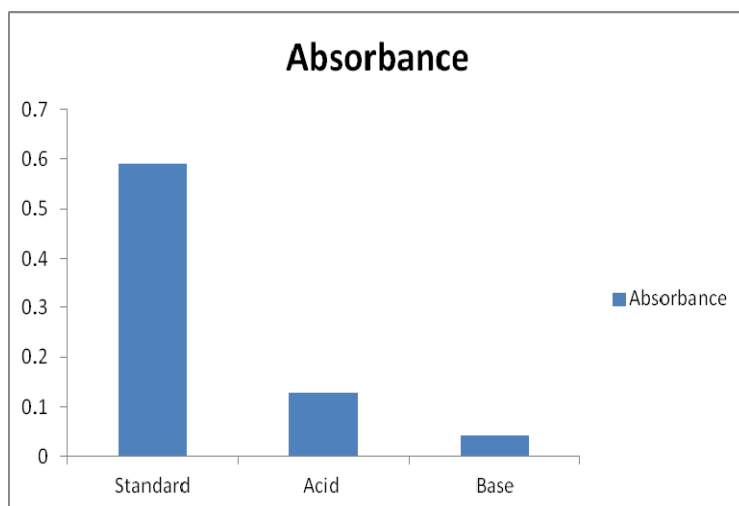


Fig-2 Absorbance of Nifedipine solution in different Medium

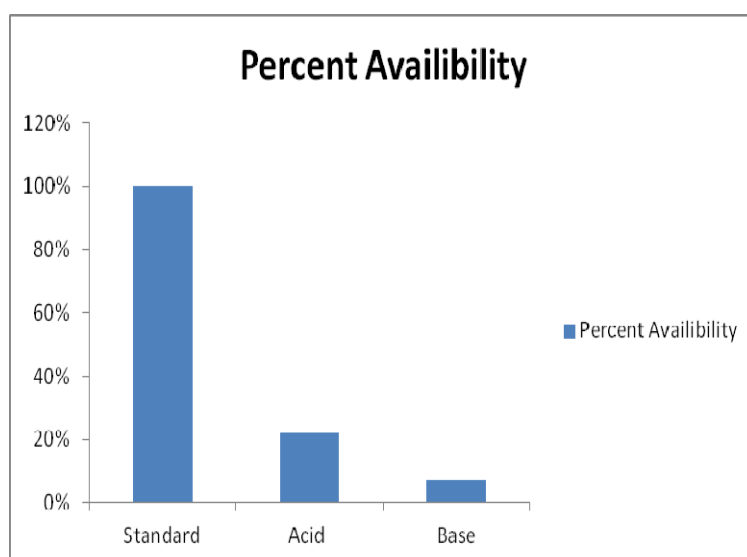


Fig-3 Percent Availability of Nifedipine in different Medium

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