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Research Article

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Spectrophotometric Determination of Amoxicillin in Drug Samples

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Abstract
A simple spectrophotometric method was developed and validated for determination of Amoxicillin in pharmaceutical products. The method was based on using distilled water as solvent. The absorbance maximum was 220 nm. The correlation coefficient was r=0.9998. The method was validated, and results obtained for the assay of three different brands of Amoxicillin capsules hard. The proposed method was successfully applied to the spectrophotometric determination of Amoxicillin.

Keywords: Amoxicillin, Method development, Spectrophotometry

1. Introduction

Amoxicillin is a broad-spectrum antibiotic, a semi-synthetic derivative of penicillin, specifically belonging to the aminopenicillin group within beta-lactam antibiotics. It is effective against gram-positive cocci, including non-penicillin-resistant streptococci, staphylococcal and enterococcal species. Amoxicillin also exhibits effectiveness against some gram-negative organisms, gram-positive anaerobic organisms, and gram- negative anaerobic organisms. It is used in the treatment of upper respiratory tract infections such as sinusitis, bronchitis, pharyngitis, tonsillitis, pneumonia, as well as skin infections, urinary tract infections, and middle ear infections. The mechanism of action of amoxicillin involves disrupting the synthesis of crucial components in the construction of the cell wall of gram-positive bacteria, leading to cell wall lysis and bacterial death. However, bacteria producing enzymes that degrade the beta-lactam ring can become resistant to amoxicillin. To address this issue, clavulanic acid is added to amoxicillin, enhancing its effectiveness [1].
In this paper a very simple and low-cost spectrophotometric method is presented, which can be used in routine quality control.

2. Materials and Methods

Materials and Equipment

We used three commercial products from the market, and all of them were 500 mg Amoxicillin hard capsules. All the chemicals and reagents used were of analytical grade. Distilled water was solvent. A Shimadzu UV-Visible double beam spectrophotometer (Shimadzu, Japan) with matched 1 cm quartz cells was used for the measurements.

Method

Preparation of Amoxicillin standard solution

A 10 mg mass of the pure reference material was weighed and dissolved in solvent in a 100 mL volumetric flask and the volume made up to mark with same solvent (0.1 mg / mL).

Working solutions were prepared by making appropriate dilutions of this standard Amoxicillin solution (25% - 125% from target concentration of 0.01 mg /ml).

General Procedure

A blank solution was prepared in the same way but excluding the analyte (Amoxicillin). The above solutions were all prepared in triplicates. The absorbance of each solution was measured at 220 nm against a blank, distilled water.

The calibration curve for the drug was constructed in selected solvent. Regression equation for the data was derived with the aid of Microsoft Excel software program. Each concentration of standard solution was assayed in triplicates and the mean absorbance obtained was then plotted versus concentration.

Determination of Amoxicillin content in tablets using the proposed method

Three different brands of Amoxicillin hard capsules were assayed using the developed method. For each brand, the contents of 20 hard capsules were ground into a fine powder. An accurately weighed portion of the powder equivalent to 10 mg Amoxicillin was transferred into a 100 mL volumetric flask, dissolve in solvent using mechanical shaking for 15 minutes, and made up to mark with the same solvent. After that, 2 mL was pipetted into a 20 mL volumetric flask a dilute with same solvent to mark. The content of each label claim was verified by comparing the concentrations obtained from the validated curves with the actual concentrations of the drug taken.

3. Results & Discussion

The content of Amoxicillin in the tested samples was determined by spectrophotometric method using distilled water as solvent. To method verification, the linearity of the standard solution was done (Figure 1).

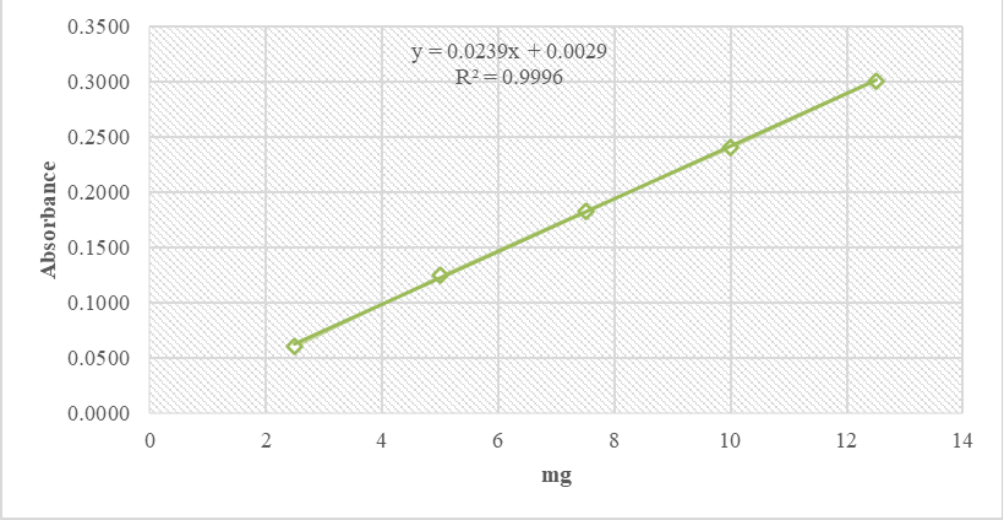

Figure 1: Linearity for Amoxicillin at 220nm

In Table 1 are results for three brands of Amoxicillin capsules, hard

Table 1: results for three brands of Amoxicillin capsules, hard at 220nm

Sample	Absorbance	Found Amoxicillin in mg	Found Amoxicillin in %
A-500 mg	0.264984	532	106.5
B-500 mg	0.227116	455	91.1
C-500 mg	0.261627	526	105.1

4. Conclusion

This is quite simple, accurate and precise method for determination of Amoxicillin in hard capsules and it can therefore conclude that is suitable for routine analysis of Amoxicillin. All results have been demonstrated to be suitable for the spectrophotometric analysis of Amoxicillin in formulated products, using distilled water as solvent. The method has the advantage of being simple, linear and suitable for routine control of Amocicillin in dosage form without any interference from excipients. According to British Pharmacopoeia and American Pharmacopoeia monographs for the finished product, specification limits for assay contents are 92.5% - 110.0% (BP), 90.0% - 120.0% (USP), which means that all samples are within.

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