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SIMULTANEOUS ESTIMATION OF CURCUMIN AND PIPERINE IN MARKETED FORMULATION

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ABSTRACT

Turmeric contains a yellow-colored chemical called curcumin, which is often used to color foods and cosmetics. Turmeric is commonly used for conditions involving pain and inflammation, such as osteoarthritis. It is also used for hay fever, depression, high cholesterol, a type of liver disease, and itching. Piperine has been shown to help relieve nausea, headaches and poor digestion and also has anti-inflammatory properties. This explains how piperine can help to make curcumin more bioavailable. With just 1/20 teaspoon or more of black pepper, the bioavailability of turmeric is greatly improved, and turmeric's benefits are further enhanced. The developed UV-Visible Spectrophotometric method for the simultaneous estimation of curcumin and piperine in the tablet dosage form in the solvent system methanol and distilled water 1:1 ratio give proper estimation of percentage label claim of marketed product.

Keywords: Curcumin, Piperine, UV estimation.

INTRODUCTION

Turmeric contains a yellow-colored chemical called curcumin, which is often used to color foods and cosmetics. Turmeric is commonly used for conditions involving pain and inflammation, such as osteoarthritis. It is also used for hay fever, depression, high cholesterol, a type of liver disease, and itching. High doses of turmeric and curcumin are not recommended long-term since research confirming their safety is lacking [1]. However, the World Health Organization (WHO) has determined 1.4 mg per pound (0–3 mg/kg) of body weight an acceptable daily intake. Black pepper contains the bioactive compound piperine, which is an alkaloid like capsaicin, the active component found in chili powder and cayenne pepper. Piperine has been shown to help relieve nausea, headaches and poor digestion and also has anti-inflammatory properties. This explains how piperine can help to make curcumin more bioavailable. With just 1/20 teaspoon or more of black pepper, the bioavailability of turmeric is greatly improved, and turmeric's benefits are further enhanced [2].

CHEMICALS AND REAGENTS

All the reagents in this assay along with triple distilled water were of analytical grade. Curcumin and piperine were obtained as a gift samples and the formulations were bought from the market.

INSTRUMENTATION

Spectral analysis were made on a Jasco Spectrophotometer, Model- V-630 (Japan), was employed with spectral bandwidth of 1nm and wavelength accuracy of ±0.3nm with automatic wavelength correction with a pair of 10mm quartz cells. Glass wares used in each procedure were soaked overnight in a mixture of chromic acid and sulphuric acid rinsed thoroughly with double distilled water and dried in hot air oven.

METHODOLOGY

Validation Linearity Working standard solution of curcumin and piperine was taken in different 10 ml volumetric flasks and diluted up to mark with distilled water to obtained concentrations 50, 60, 70, 80, 90µg/ml of curcumin and 2, 4, 6, 8, 10µg/ml of piperine. A calibration curve was constructed by plotting concentration versus absorbance and line equation was calculated for both the drugs [3].

Stock Solution

Accurately weighed curcumin and piperine (10 mg each) was transfer two separate 100ml volumetric flask, dissolved in 50 ml methanol and make up the volume up to the mark. A stoke solution contained 100µg/ml of curcumin and piperine [4].

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Working Standard

Take required quantity of 100µg/ml stock solution of curcumin and piperine and diluted with distilled water to obtained working standard of both solution.

Selection of detection wavelength Solutions of drug were scanned over the range of 200-400nm. It was observed that both the drug showed considerable absorbance at 265nm for curcumin and 238nm for piperine was selected as the wavelength for detection.

Precision

The repeatability studies were carried out by estimating response of curcumin (60µg/ml) and piperine (4µg/ml) five times and results are reported in terms of relative standard deviation. The intermediate precision were carried out by estimating the corresponding responses 3 times on the same day and 3 different days for 3 different concentrations of curcumin (50,60,70 µg/ml) and piperine (4,6,8 µg/ml) and results are reportred in terms of relative std. deviation [5].

Accuracy

Recovery studies of curcumin and piperine were performed to judge the accuracy of the method by standard additions at three different levels 80, 100, 120 %. Mean percentage recovery was determined. Recovery values were calculated shown in table 1.

Assay

Tablet containing 250mg curcumin and 250mg piperine were taken and performed the Weight Variation Test as per I.P. These 20 tablets were weighed accurately and finely powdered. Tablet powder equivalent to 10mg curcumin and piperine was taken and dissolved in mixture of 50ml methanol and 50ml distilled water in 100ml volumetric flask. Sonicated this solution for 30 minutes and filter the solution. From this solution prepare working solution and the percentage content of the drugs has been found out [6, 7].

LOD and LOQ

The detection limit of an individual analytical procedure is the lowest amount of analytic in a sample which can be detected but not necessarily quantitative as an exact value. LOD = 3.3σ/S Where, σ = Relative std. deviation of the response, S = slope of calibration curve. Quantitation Limit The quantitation limit of an analytical procedure is the lowest amount of analyte in a sample, which can be quantitatively determine with suitable precision and accuracy. LOQ = 10σ/S Where, σ = Relative std. deviation of the response, S = slope of calibration curve [8, 9].

RESULTS

The developed UV-Visible Spectrophotometric method for the simultaneous estimation of curcumin and piperine was found to be simple and useful with high accuracy, precision, LOD, LOQ as per ICH guidelines. Sample recoveries in all formulations using the above method was in good agreement with their respective label claim or theoretical drug content, thus suggesting the validity of the method and non interference of formulation excipients in the estimation. In the selected solvent system methanol and distilled water, drugs were stable for more than 48 hours, thus suggesting that samples need not be estimated immediately after collection. The method was successfully used for determination of drugs in their pharmaceutical formulation.

Table 1. Assay & Recovery study

Parameter	Curcumin	Piperine
Amount used	50mcg	5mcg
Amount recovered	50.25mcg	5.12mcg
Percentage recovered	100.74%	100.98%
Label Claim	250mg	250mg
Estimated	249.19mg	248.43mg
Percentage	99.97%	99.98%

Table 2: Precision and variations studies

S. No.	Parameters	Curcumin	Piperine
1	max(nm)	265	238
2	linearity range	19-43µg/ml	21-46µg/ml
3	regression equation	Y=0.0843X-0.0861	Y=0.0903X-0.0945
4	correlation coefficient	1.254	2.465
5	slope	0.0856	0.0972
6	intercept	0.0791	0.0823
7	Limit of detection(µg/ml)	0.9879	0.9912
8	Limit of quantification(µg/ml)	6.3178	7.4284
9	Intra day	0.9257±0.0610	0.9875±0.0726
10	Interday	0.9481±0.0254	0.9914±0.0457

CONCLUSION

The developed UV-Visible Spectrophotometric method for the simultaneous estimation of curcumin and piperine in the tablet dosage form in the solvent system methanol and distilled water 1:1 ratio give proper estimation of percentage label claim of marketed product.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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