Available online on 15.08.2019 at http://ajprd.com

Asian Journal of Pharmaceutical Research and Development

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Research Article

Simultaneously Content Analysis of Sulfadoxine and Pyrimethamine in Tablet Dosage Form by Spectrophotometry Ultraviolet with Dual Wavelength Method

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A B S T R A C T

Aim: method development results from this study are expected to be one of the methods that can be applied by the relevant agencies in determining the simultaneous levels of sulfadoxine and pyrimethamine in tablet dosage form. Pyrimethamine - Sulfadoxine (PS) is an anti-malarial drug combination sulfonamide group / sulfone with nature skizontosida diaminopirimidine network, these drugs are very practical because it can be given in a single dose, and however, this combination provides a new challenge for the pharmaceutical industry in connection with the development of new analytical methods in the determination of levels.
Methods: The study was carried out experimentally by spectrophotometric method is the method of multiple wavelengths and then tested for validity based validation parameters, namely linearity, accuracy, precision, LOD and LOQ and intraday and inter day. Then, the method is tested on dosage tablets containing pyrimethamine and sulfadoxine that are on the market.
Results: The results showed that the application of the method of multiple wavelengths at a concentration carried out at λ 284.8 nm and 258.8 nm to pyrimethamine and at λ 274.2 nm and 291.6 nm to sulfadoxine. Research results successfully applied the method
dual wavelength which is successfully applied to determining the concentration of pyrimethamine and sulfadoxine simultaneously in a tablet.

Keywords: Pyrimethamine, sulfadoxine, tablet, ultraviolet spectrophotometry and dual wavelength method

A R T I C L E I N F O: Received 08 June 2019; Review Completed 31 July 2019; Accepted 03August 2019; Available online 15 August 2019

Cite this article as:

Andry Muhammad , De Lux Effendy, Putra Muchlisyam, Simultaneously Content Analysis of Sulfadoxine and Pyrimethamine in Tablet Dosage Form by Spectrophotometry Ultraviolet with Dual Wavelenght Method, Asian Journal of Pharmaceutical Research and Development. 2019; 7(4):34-37, **DOI:** http://dx.doi.org/10.22270/ajprd.v7i4.555

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INTRODUCTION

Pyrimethamine - Sulfadoxine (PS) is an anti-malarial drug combination sulfonamide group / sulfone with nature skizontosida diaminopirimidine network. These drugs are very practical because it can be given in a single dose. Pyrimethamine has the chemical name 2,4-Diamino-5- (p-chlorophenyl) -6-ethyl pyrimidine and sulfadoxine N1 chemical name (5,6-dimethoxy-4-pyrimidinyl) Sulfanilamide. Determination of PTN and SDN in a condition determined by the spectrophotometric method, in which the PTN has a maximum absorbance at 284.8 nm and 274.2 nm to SDN (1-2). Spectrophotometric method is simple, fast and relatively easy compared to other methods, the method of multiple wavelengths (DWM) is a spectrophotometric method which can be used to analyze two drug mixtures simultaneously without having to perform the separation, easily applied to routine analysis and without the need for prior derivatization (3-4). Dual wavelength method, in this method have two wavelengths (λ1, λ2) where drug A shows the same absorbance (or the difference between the absorbance is zero) so that drug B can be determined and vice versa for drug B (5). This method can be a choice in determining the level of medicine, research must be done to prove a double wave method can be used to determine the levels of PTN and SDN in tablet dosage forms. λ2) where drug A shows the absorbance of the same (or the difference between the absorbance is zero) so that drug B

can be determined and vice versa for drug B (5). This method can be a choice in determining the level of medicine, research must be done to prove a double wave method can be used to determine the levels of PTN and SDN in tablet dosage forms. λ2) where drug A shows the absorbance of the same (or the difference between the absorbance is zero) so that drug B can be determined and vice versa for drug B (5). This method can be a choice in determining the level of medicine, research must be done to prove a double wave method can be used to determine the levels of PTN and SDN in tablet dosage forms.

MATERIALS AND METHODS

Apparatus

1800 UV-Vis spectrophotometer (Shimadzu) and a set of Personal Computer (PC) equipped with UV-Probe 2:42 software, Microsoft Excel and SPSS 20, Matlab® version R2016a, cuvette 1 cm, glass tools (Oberoi), mortar and pestle , a rubber ball, analytical balance (Boeco), sonicator (Branson 1510), a pH meter (Hanna) as well as other tools that are required in sample preparation and solution.

Reagents and materials

All reagents used are grade analysis, unless otherwise stated. Raw Materials, Sulfadoxine (BPOM), Pyrimethamine (BPOM), akuabidestilata (PT. Ika Pharmindo), Methanol (E-Merck), HCL (E-Merck), Whatman filter paper no. 42 Parchment Paper, tablet S (Actavis), tablet P (IFARS).

Preparation of standard stock solution

PTN and SDN (each 50 mg) was transferred into a 50 mL volumetric flask and then diluted with methanol and added to the line mark. The concentration of the stock standard is 1000 ug / mL (stock solution I). 5 mL of stock solution was transferred into a 50 mL volumetric flask and then diluted with methanol by adding a line to sign, and its concentration has to be 100 ug / mL.

Determination of the Maximum Absorption Spectra and Spectra absorption ratio

PTN (0.9mL) and SDN (0.6mL) of the pipette (stock solution II) and transferred to individual 10mL volumetric flasks. Furthermore, the solution is diluted with methanol, and then both ends meet, so the concentration 9 mg/mL for PTN, 6 mg /mL for the SDN and mix both drugs with the same concentration prepared for dual wavelength method. PTN ratio of the absorption spectrum in the range of 5-13 mg /mL (series A) and 3-9ug /mL for SDN (series B) and a mixture of both drugs (series C) in the same concentration range prepared for dual wavelength method.

Dual Wavelength Method

PTN showed absorbance spectrum identical at 284.8 nm (λ3) and 258.8 nm (λ4) is therefore both wavelengths have been selected for analysis SDN. All the solutions of the series A is scanned to ensure that the difference between λ3 and λ4 is zero. Similarly, the solution SDN scanned to determine the two wavelengths, where the absorbance is the same. Two wavelengths was found 274.2 nm (λ1) and 291.6 (λ2) is selected for analysis PTN. All solutions of series B is scanned to ensure that the difference between (λ1) and (λ2) is zero. After that, the solution C series is scanned to ensure that variations in the concentration of PTN and SDN did not affect the absorbance at the selected wavelength. Absorbance difference between (λ1) and (λ2) series C solution used for preparation of calibration curves for PTN. As well as,

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Validation Tests

Linearity

PTN and standard solutions for SDN's absorption spectrum is made of dots selected wavelength 284.8 nm and 258.8 nm for PTN, while SDN using a wavelength 274.2 nm and 291.6 nm. Differences in absorbance values of the C series are used to derive the regression equation for each component at the selected wavelength (7) (8).

Reparability

Reparability methods studied by repeating the method of six times. For intra-day precision study, this method was repeated three times a day. Similarly, the method is repeated on three different days to determine inter-day precision.

Precision

Precision determination based on the value of relative standard deviation (RSD) 2% (7) (8).

Recovery

Recovery is calculated by measuring the percentage of recovery in three specific points, namely: 80%, 100% and 120%. At any specific point, the test is used 70% of the sample and 30% of the pure active substance (standard addition method) (7) (8).

Preparation of the sample solution

Twenty tablets are weighed and crushed homogeneously. Furthermore, weighed amount of powder equivalent to 500mg and 25mg PTN SDN, then equality contained there counted and weighed up to six repetitions. Next, the powder put in a 50 mL flask and diluted with methanol (with the sonicator for 15 minutes). After that, the solution was added with methanol to mark lines and shaken until homogeneous. Thereafter, the solution was filtered, then about 10mL filtrate discarded first. Subsequently, 0.9mL of filtrate was put into 25 ml flask and diluted with methanol until the boundary line to get a solution to PTN and the concentration of SDN each of 9 mg / mL and 6 mg / mL. After that, the absorption of the solution is measured at a wavelength of 200-400nm.

RESULTS AND DISCUSSION

Studies overlain spectrum and wavelength selection

In the study overlain with appropriate concentrations and in accordance with the Lambert-beer law. With a scalable solution concentration, 9 mg / mL and 6 mg / ml and the mixture of both in the same concentration, respectively scanned with a range of 200-400 nm and overlain observed spectrum of PTN and SDN is shown in Figure 1

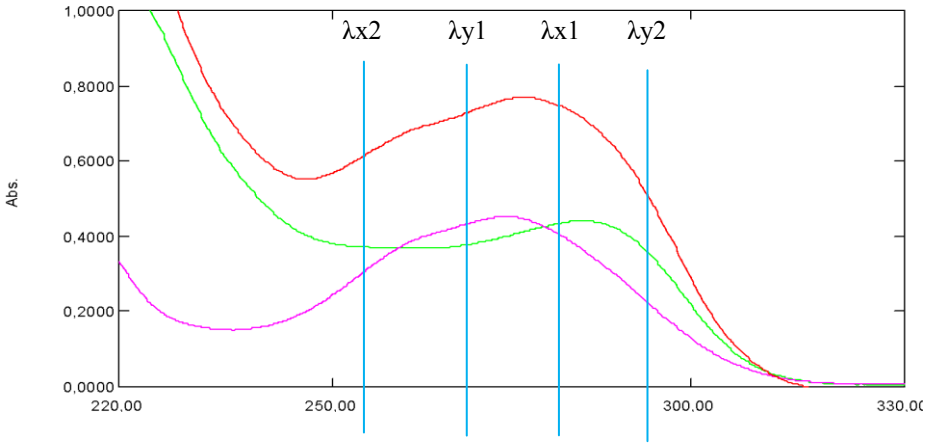

Figure 1: Overlain spectrum of SDN and PTN

The maximum absorption spectrum PIR and SUL and mixtures thereof.

Information :

SDN spectrum 6 mg / mL + PTN 9 mg / mL

SDN spectrum 6 mg / mL

PTN spektrum 9 mg / mL

Table 1: Result of calibration readings for SUL and PIR

concentration (ppm) PTN	Differences in absorbance of SDN at 274.2 and 291.6 nm	Concentration (ppm) SDN	Absorbance difference of PTN at 284.8 and 258.8 nm
5	0.0000	3	0,000
7	0.0002	4.5	-0.003
9	0.0000	6	0,001
11	0.0002	7.5	0,001
13	0.0006	9	0.007

Overlay of the study, two spectral wavelengths chosen to 274.2 nm and 291.6 nm SDN where absorbance difference is 0 so that it can be used for analysis of PTN, while PTN 284.8 nm and 258.8nm was used for the analysis SDN. For the calibration curve, spectral ratios ranged from 5-13mg/mL for PTN (series A) and 3-9ug /mL for SDN (series B) and a mixture of both drugs (series C) in the same concentration range with a ratio of 9: 6. the results of the calibration readings for PTN and SDN are shown in table 1.Test for tablet dosage forms that are commercially available do and the results are shown in Table 2. The results of drug levels in the market indicate that the drug meets the requirements of the DWM can be applied to define the level of SDN and PTN in preparation to meet the requirements where the levels of the substance of the analysis results are within range 90-110%

Validation Test:

The production of valid test relusts must be achieved for chemical analysis activities. The validation test results can be described as test results that have good linearity, precision, and accuracy.

Linearity

PTN and SDN calibration curve was linear in the range of 5-13ug/mL and 3-9ug /mL. The regression equation of calibration curve is Y sdn = 0,0127X + 0.0008, r = 0.9998 for the SDN and Y ptn = 0,0136X - 0.0014, r = 0.9997 for PTN

Precision

The relative standard deviation (% RSD) for interday each found to be 1.09 and 5.45 for the SDN and PTN. Intraday precision of each indicate% RSD 2.64 and 2.97 for the SDN and PTN.

Limit of Detection (LOD) and Limit of Quantitation (LOQ)

LOD for PTN SDN and found each of 0.20 mg / mL and 0.39 mg / mL. LOQ for SDN and PTN found each 0.61 mg / mL and 1.18 mg / mL. Validation results are shown in Table 3.

Recovery

Recovery percentage of formulations marketed drug is determined by the standard addition of pure drug in three (80%, 100% and 120%) of known concentration and

excellent recovery obtained on each level. The percentage of recovery for PTN is a three-level, 80%, 100% and 120% respectively for SDN 100, 96, 101, 08 and 100.02, while for PTN is 99.8, 100.36 and 100.37. Recovery shown in Table 4.

Table 2: Results of simultaneous estimation of SUL and PIR in the marketed formulation by Dual Wavelength spectrophotometry method

Preparations Tablets	Component	Content (%)
tablet S	SDN	101,59 ± 1,9309
	PTN	99,89 ± 4,0359

Table 3: Validation of Dual Wavelength Method

No.	Parameter	PTN	SDN
1	Analytical wevelengths for determination (nm)	284.8 nm and 258.8 nm	274.2 and 291.6
2	Lamber beer (ug / mL)	3-12	1-12
3	Regression equation	Y = 0,0136X - 0.0014	Y = 0,0127X + 0.0008
4	correlation coefficient	0.9997	0.9998
5	Accuracy (%)	100.27	101.03
6	Precision (RSD) (%)	0.82	0.57
7	Interday (% RSD)	1.29	1.16
8	Intraday (% RSD)	0.47	2.35
9	LOD (ug / mL)	0.39	0.20
10	LOQ (ug / mL)	1.18	0.61

Table 4: Recovery studies

No.	Drug	Concentration (%)	Recovery (%)
1	PTN	80%	99.8
2	PTN	100%	100.36
3	PTN	120%	100.37
4	SDN	80%	100.96
5	SDN	100%	101.08
6	SDN	120%	100.02

CONCLUSION

The proposed double wave method gives accurate and precise results for the determination of Pyrimethamine and Sulfadoxine in the marketed formulation (tablet) without prior separation and easily applied to routine analysis. The most interesting feature of dual wavelength method is simplicity and speed. The validation method has been demonstrated by various tests for linearity, accuracy and precision. The proposed method successfully applied to the determination of this drug in a commercial tablet.

ACKNOWLEDGMENT

The authors are grateful to the Agency for Food and Drug Administration of the National Republic of Indonesia to provide a standard PTN and SDN in this study.

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