Derivative Absorption Spectrophotometry for the determination of Bambermycin and Paracetamol in Pharmaceutical Drugs

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Abstract

Derivative spectrophotometric techniques were used for the determination of bambermycin with paracetol binary mixture. Simultaneous determination of these compounds was accomplished by derivative (^{1}D,^{2}D, and ^{3}D) spectrophotometric technique and applying zero-crossing technique used for determination of bambermycin and paracetol in capsules (samera, India). The second order derivative absorption spectra at vally λ=235 nm were used for bambermycin and also the second order derivative absorption spectra at λ=268nm were used for paracetol . No interference were found between both constituents and those of matrix. A good accuracy and precision of simultaneous determination of these compounds were confirmed by statistical analysis. The recovery of individual constituent under established conditions is very high and ranges for synthetic standard mixture and capsules for 98.8- 96.85- 99- 96.5 respectively.

Introduction

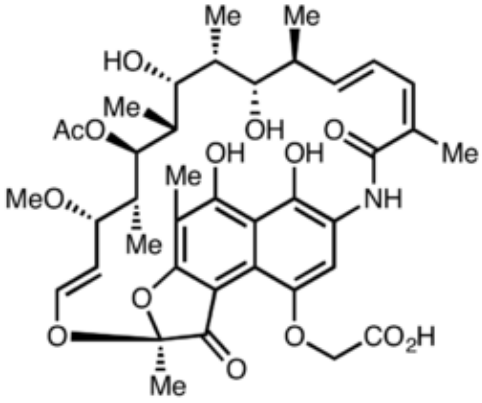
Rifamycin-resistant *Mycobacterium tuberculosis* infection (i.e.,by a strain of *M. tuberculosis* that is only resistant to rifamycins)occurs disproportionately among patients infected with the human immunodeficiency virus (HIV) who have allow CD4 cell count. Them observed 3 genetically confirmed cases of relapse with rifamycin-resistant *M. tuberculosis* infection following concurrent treatment with rifabutin (dosage, 150mge very day) and a ritonavir-boosted HIV protease inhibitor during a prior episode of drug-susceptible tuberculosis. Higher doses of rifabutin and a ritonavir-boosted HIV protease inhibitor as treatment for tuberculosis should be studied further(1).

To study the parameters before and after inoculation. Five colonies from each fecal specimen suspected of being Salmonella were isolated, seriologically identified, and tested for susceptibility to 10 antibiotics. The use of bambermycins supplemented feed reduced the duration and

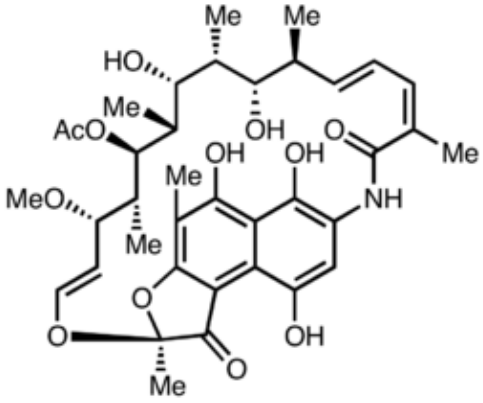
prevalence of Salmonella shedding in pigs. Bambermycins fed pigs showed an increased rate of shedding during the first 10 days and except for 2 days, the quantity of Salmonella shed was less (2).

Furthermore, feeding bambermycins diets significantly reduced the number of Salmonella

resistant to ampicillin, streptomycin, triple Sulfa, and tetracycline(3).



bambermycine B



bambermycin SV

This figure show the bambermycine B and bambermycin SV, Of the various bambermycins(4). A high performance liquid chromatography method was reported for the determination of relative content of bambermycin A in bambermycin premix using an ODS column and 0. 2% ammonium formate (pH 4.9) -acetonitrile (55:45) solution as mobile phase with the detection wavelength at 258 nm and AUFS at 2. 00. Injection volume was 10 μL and flow rate was 0. 5 mL/min. The retention times of bambermycin component 1 , 2, 3, 4 were 0.9, 1.1, 1.2 and 1.3 times relative to that of bambermycin A respectively(5). The method was simple and accurate(6). Since no susceptibility breakpoints are available for most of the antibiotics discussed, an alternative approach to the interpretation of MICs is presented(7). Also, some pharmacokinetic data and information on the influence of these products on the intestinal flora are presented(8).

Prparation of Bamberamycin and Paracetamol using drug Capsules

1- Capsule were weighted amount of the powder containing 0.01g of bambermycin was dissolved in 100ml of distilled water.
2- Capsule were weighted amount of the powder containing 0.01g of Paracetamol was dissolved in 100ml of distilled water.

Procedure for Assay bambermycin and paracetamol in pharmaceutical prepration by UV_measurement:

The absorption spectra of bambermycin, and paractamol were measured from (200-400)nm against distilled water as blank. The wavelength at absorption maximum (λ_{max}) was identified. The calibration curves were constructed for these drugs at their respective (λ_{max}).The derivative spectra $^{1}D,^{2}D,^{3}D$ have been taken from normal spectrum for each drug by the computer of SHIMADZU UV-probe date system program and the parameters S and λ_{max} were optimized. The suitable wavelengths peak (P) and vally (V) at (λ_{max}) were identified for standard drug. The calibration curves of each different concentration were constructed and used to determined the concentration of each drug. The derivative spectra $^{1}D,^{2}D,^{3}D$ have been taken from normal spectrum (zero order) for binary drugs of bambermycin and paracetamol. The suitable derivative at a suitable wavelength using zero crossing techniques were used to construct calibration curves for these standard drugs, which were used to determine the concentration of each drug present in the mixture.

Result and Discussion

The normal spectrum of bambermycin and paracetamol respectively; fig. 1 absorption maximum for bambermycin at 262nm.

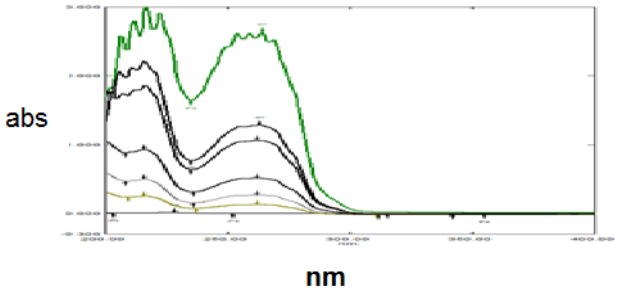


Figure 1:Spectrum of Bambermycin

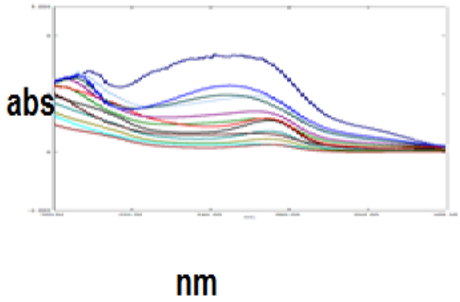


Figure 2 :Spectrum of paracetamol

fig. 2 show absorption maximum for paracetamol at 254nm. A figure 3 shown the linear Calibration curve of bambermycin, and figure 4 shown the linear Calibration curve of paracetamol.

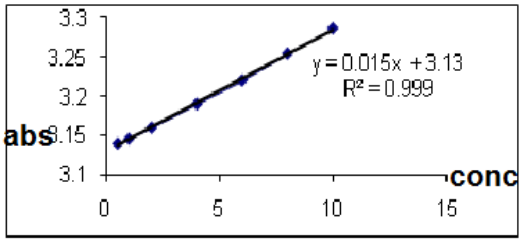


Figure 3 shown the linear Calibration curve of Bambermycin

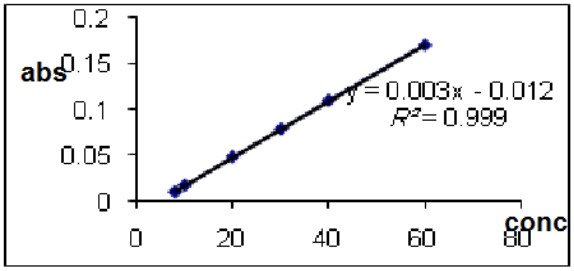


Figure 4 shown the linear Calibration curve of paracetamol

The first mixture were done by taking different concentration of Bambermycin and fixed concentration of paracetamol as shown in fig. 5, and the second mixture were done by reverse procedure as shown in fig. 6.

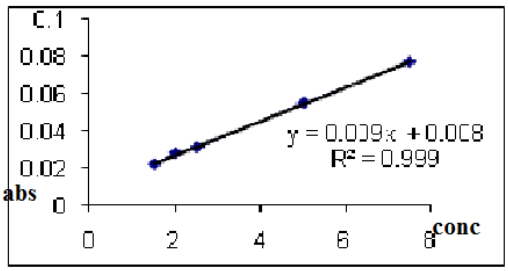


Figure 5 shown the linear
Calibration curve of change concentration bambermycin and fixed concentration of paracetamol

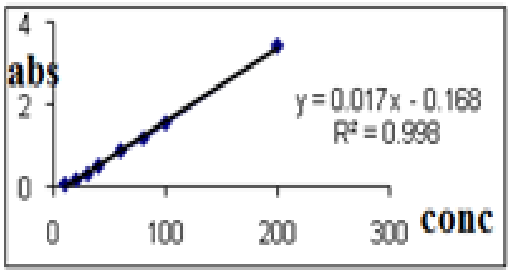


Figure 6 The linear Calibration curve of change concentration of paracetamol and fixed concentration of bambermycin

Table 1:The parameters of Bamberamycin

Parameters drugs	Linearity range (mg/L)	Regression equation Y=ax+b	Correlation coefficient (r)	RSD%
Bambermycin	0.5-10	Y=0.0065x+3.154	0.999	0.38
Paracetamol	2-60	Y=0.0031x-o.o126	0.999	37.98
Change bambermycin+Fixed paracetamol	1.5-10	Y=0.091x+0.0088	0.999	24.2
Fixed bambermycin+ change paracetamol	200-10	Y=0.0178x-0.1687	0.999	34.4

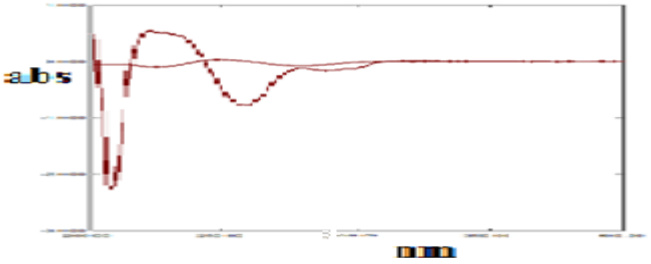
Table 1, show the RSD for Bambermycin from anather.

The utility of the method was tested for bambermycin and paracetamol; the result found for bambermycin and paracetamol capsules is shown in Table (2).

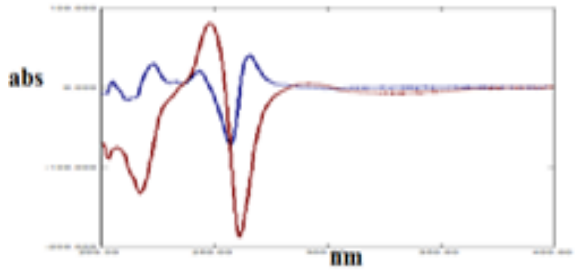
Table 2:Determination of Bambermycin and Paracetamol in capsule using spectrophotometer.

Pharmaceutical	**Bambermycin**	**Paracetamol**
Taking(g)	0.5	0.5
measured(g)	0.5352	0.5264
Error%	3.52	2.64

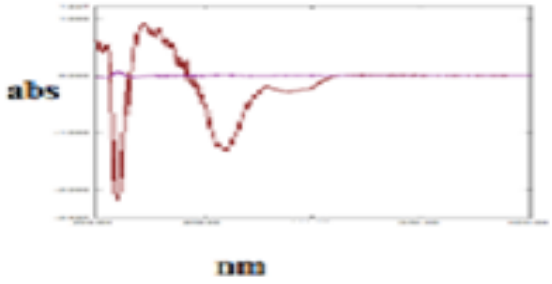
This study that normal spectrum cannot be used to determine bambermycin and paracetamol present in their mixture, due to interfering between the spectra, therefore; derivative spectrophotometeric methods D^1, D^2, D^3 were used in this case fig. 7 (a, b and c).



(a)

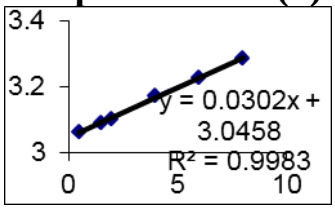


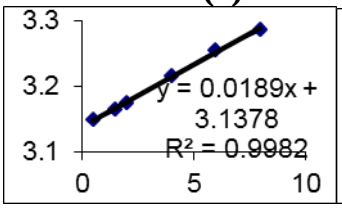
(b)

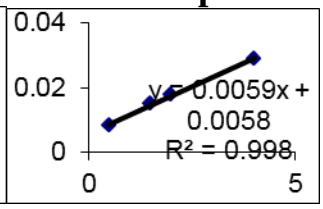


(C)

Figure 7(a) first derivative Spectra of 20mg/L for each bambermycin and paractamol (b)second derivative (c) third derivative spectra







(a) (b) (C)

Figure 8 Calibration curve of (a) 1st derivative of Bambermycin, (b) 2nd derivative of Bambermycin , and (c) 3rd derivative of Bambermycin

The linear relationship between amplitude of the D1, D2, D3 spectrum and concentration of Bambermycin with paracetamol at 259.3, 263, and 231.5 respectively. A comparation between some parameters using three derivative orders is shown in Table 3.

Table 3. The relative error and recovery for the determination of bambermycin in the presence of paracetamol at 259.3 and 263, and 231.5 nm using derivative method.

Bambermycin and Paracetamol	Bambermycin found mg/L259.3nm	Rec.%	Error%	Bambermycin mg/L 263nm	Error%	Rec. %	Bambermycin 231.5 nm	Recovery%	Error%
6	6.376	106.3	6.3	5.934	-1.1	98.9	5.947	99.12	-0.88
8	10.280	128.5	28.5	7.87	-1.625	98.37	9.296	92.96	16.2
10	13.626	136.26	36.26	9.993	-0.07	99.93	11.715	117.15	17.15
20	16.787	83.93	-16.1	19.378	-3.11	96.89	18.331	91.655	-8.34
30	27.477	91.59	-8.41	30.663	2.21	102.2	31.444	104.813	4.81
40	37.703	94.26	-5.74	40.607	1.52	101.5	39.181	97.95	-2.05
100	101.75	101.75	1.751	59.49	-0.85	99.15	99.98	99.98	-0.02

From this table, show the second derivative is the best, when the bambermycin measure, the paracetol not measured.

The calibration curve was constructed of ^{1}D,^{2}D and ^{3}D for standard solutions (4-80 mg/L) show the relative error and recovery for the drugs.

Table 4. The relative error and recovery for the determination of paracetamol in the presence of bambermycin at 239, 223.37and 226.6nm using derivative method.

Bambermycin and Paracetamol	paracetamol found mg/L at 239nm	Error %	Rec%	Paracetamol found mg/L 223.37nm	Error%	Rec.%	paracetamol found mg/L at 226.6nm	Error%	Rec.%
4	3.9	-2.5	97.5	3.77	5.75	94.25	4.2	-5	105
6	5.93	-1.2	98.83	5.64	6	94	6.13	-2.2	102.2
8	8.2	2.5	102.5	7.77	2.87	97.13	8.02	-0.25	100.25
10	10.37	3.7	103.7	10.07	-0.7	100.07	9.79	2.1	97.9
20	19.67	-1.65	98.35	20.02	-0.1	100.6	20.3	-1.5	101.5
30	30.88	2.93	102.9	30.99	-3.3	103.3	29.85	0.5	99.5
40	40.75	1.875	101.9	40.18	-0.45	100.45	39.62	0.95	99.05
60	58.97	-1.72	98.3	59.64	-0.45	99.4	60.08	-0.13	100.13
80	79.23	-0.96	99.04	79.55	-0.56	99.44	80.11	-0.14	100.14

Analysis of Pharmaceutical Sample

simultaneous determination of bambermycin and paracetamol in pharmaceutical sample using derivative spectrophotometric method with the best derivative and wavelengths for these mixture (20mgL bambermycin+2mg/L paracetamol) was measured by using ^{1}D and ^{2}D methods as shown in table (5).

Table (5): The relative error and recovery for the determination of 20mg/L bambermycin +2mg/L of paracetamol using Derivatives methods

Drugs method	Bambermycin		Paracetamol	
	^{1}D	^{2}D	^{1}D	^{2}D
λ_{max}(nm)	259.3	263	239	223.37
Conc. Found (ppm)	19.76	19.37	1.98	1.93
%Error	1.2	3.15	1	3.5
%Recovery	98.8	96.85	99	96.5

Table (5) shows the results for the determination of bambermycin and paracetamol mixture by ^{1}D and ^{2}D methods. The suitable method that accurate result was the ^{2}D method at (263, 223.37)nm for bambermycin and paracetamol respectively.

Conclusion

A quick and accurate method for determin bambermycin and paracetamol antibiotics in pharmaceutical sample was carried out using derivative spectrophotometric method. The advantage of this method is that both constituents can be determined directly in a single sample without the need to be separated. It was also found that auxiliary drug components had no effect on the results of determination obtained under established conditions.

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مشتقة الامتصاص الطيفي في تعين البمبرمايسين و البراستيمول في الادوية الصيدلانية

هدى غالب سلمان/علوم الكيمياء /جامعة النهرين

الخلاصة

استخدم في هذا البحث المشتقات الطيفية لتقدير المضاد الحيوي في المزيج المزدوج من البمبرمايسين والبراستول التحليل المتعاقب لهذه المركبات تم باشتقاق كل من المشتقة الاولى والثانية والثالثة مع طريقة التقاطع الصفري لتحديد الاطوال الموجية المناسبة لتقدير كل منهما في كبسولات الادوية0 وجد ان المشتقة الثانية كانت مناسبة لتقدير البمبرمايسين وفي الطول الموجي 235 نم والمشتقة الثانية مناسبة لتقدير البراستول وفي الطول الموجي 268نم وبدون مداخلات مع مكونات الدواء0 دقة وحدود ثقة جيدة للتقدير المتعاقب لكليهما اعتمادا على التحليل الاحصائي وكما يلي: نسبة استرجاع لكل منهما في النموذج القياسي والكبسولات الدوائية 96.5 -99 -96.85 -98.8على التوالي.