Medical Sains : Jurnal Ilmiah Kefarmasian
Vol. 8 No. 4, October – December 2023
https:/ojs.stfmuhammadiyahcirebon.ac.id/index.php/iojs

IDENTIFICATION OF MEDICINAL COMPOUND IN URIC ACID JAMU BY THIN LAYER CHROMATOGRAPHY METHOD

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Submitted: 19 December 2023 Revised: 29 December 2023 Accepted: 29 December 2023

ABSTRACT

Jamu is one of the traditional medicines derived from natural ingredients distributing in Indonesia. In accordance with Permenkes No. 007 of 2012, Medicinal Compound (MC) are prohibited from being added to jamu products. Previous research has found that some of the products in public contain MC. The aim of this study is to determine the presence or absence of allopurinol, piroxicam, and dexamethasone in uric acid jamu. This research used 5 (five) samples of uric acid jamu, both those with and without distribution permits from The Indonesian Food and Drug Authority, randomly selected in Kedawung District, Cirebon Regency, West java, Indonesia. The identification method used in this study is Thin Layer Chromatography (TLC) with the stationary phase being silica gel GF 254. For the identification of allopurinol, the mobile phase is n-butanol: ammonium hydroxide: ethanol; for piroxicam identification, it is ethyl acetate-methanol-ammonia (6:3:1); and for dexamethasone identification, it is chloroform: acetone (1:4). Spot detection is done using ultraviolet (UV) light at 254 nm. The applied solutions are the test solution (A), the test solution with added allopurinol, piroxicam, or dexamethasone (B), and the reference standard solution (C). The research results from the 5 (five) samples of uric acid jamu identified one positive samples containing allopurinol, and all positive samples contained piroxicam and dexamethasone.

Keywords: Jamu, thin-layer chromatography, allopurinol, piroxicam, dexamethasone

INTRODUCTION

Gout is a painful inflammation caused by the accumulation of crystals in the joints due to the high levels of uric acid in the body. In addition to causing pain, gout also makes the joints experience swelling, inflammation and even heat and stiffness (Astuti *et al.*,, 2018). The tendency of people to follow the natural trend has led to the increasing use of natural materials, both as medicine and for other purposes. People believe that traditional medicines do not have serious side effects and are considered very safe when consumed over a long period of time compared to consuming drugs from chemicals or synthesizers (Minarsih & Padanun, 2021).

The addition of dexamethasone, piroxicam, and allopurinol to jamu is dangerous, as it can cause serious side effects. This is because herbal medicine is sold freely, and the use of jamu containing these drug chemicals is not controlled. Dexamethasone often leads to myopathy (muscle atrophy and pain) with oral use and also exerts a strong adrenal suppressive effect (Saputra, 2015). The use of allopurinol has several side effects, including skin redness, leukopenia, occasional gastrointestinal toxicity, and an increased risk of acute gout attacks at the beginning of therapy (Pertamawati, 2015). Piroxicam can cause upper abdominal pain, headaches, and stomach ulcers (Setiabudi, 2016)

However, with the increasing use of traditional medicine, many herbal medicine producers have violated these provisions by mixing MCs into herbal medicine preparations for better efficacy, even though this is prohibited.

The findings related to illegal jamu can be seen from the test results of The Indonesian Food and Drug Authority in 2014, revealing that as many as 51 types of herbal medicine contained medicinal chemicals and did not have a distribution permit (Fauziah & Maisura, 2019). In a press release held by Indonesian Food and Drug Authority on October 4, 2022, regarding traditional medicines made from chemicals, 41 types of traditional medicines containing medicinal chemicals were found with various brands.

Rahmatullah *et al*.,(2018) found that a number of gout herbal medicine samples circulating in the Pekalongan Regency contained piroxicam and allopurinol, and Penelitian Umamah (2022) stated that one sample was positive for allopurinol in gout herbal medicine. The results of research conducted by Zahra (2018) showed that one of the herbal medicine samples contained dexamethasone. According to the article review from Safitri, PM (2022) from the first article that examined 8 samples of uric acid herbal medicine, 2 samples were positive for allopurinol; from the second article that examined 10 samples of gout herbal medicine, 6 samples of herbal medicine were positive for allopurinol while the other 4 herbal medicine samples contained piroxicam, prednisone, and paracetamol; while from the third article that examined 3 samples of uric acid herbal medicine, 1 sample was positive for allopurinol.

Considering that the medicinal chemicals that may be added to gout herbs with the aim of increasing efficacy are quite numerous because they include many drugs, such as allopurinol, paracetamol, metampirone, piroxicam, mefenamic acid, phenylbutazone, dexamethasone, and prednisone, this study was limited to only 3 types of MCs identified, namely allopurinol, piroxicam, and dexamethasone.

Thin Layer Chromatography (KLT) was used to identify the MC content in uric acid jamu. One of the advantages of the thin-layer chromatography method over high-performance liquid chromatography lies in the analysis of a number of samples that can be performed simultaneously with a small amount of mobile phase (Roni & Minarsih, 2021).

RESEARCH METHODS

Tools and Materials

TLC tools, capillary tube (Marienfeld), UV lamp 254 nm (Philips) , sonicator (Digital Pro), ruler. Samples of uric acid jamu from 5 different brands, allopurinol tablets 100 mg (Dexa Medica), piroxicam tablets 10 mg (Kimia Farma), dexamethasone tablets 0.5 mg (Harsen), ethyl acetate (Merck), methanol (Merck), ammonium hydroxide (Merck), sodium hydroxide (Merck), hydrochloric acid (Merck), ether (Merck), ethanol 96% (Merck). n-butanol (Merck); (PT. Harsen), chloroform (Merck), methanol (Merck), acetone (Merck), distilled water (Brataco), and silica gel GF 254 TLC plates (Merck).

Research Procedure

1. Sampling

   The samples obtained were randomly selected herbal medicines from Kedawung District, Cirebon Regency, West Java, Indonesia.

2. Herb Packaging Observation and Herb Powder Organoleptic Observation

   Observations on packaging such as packaging type, production address, registration number, batch number, expiration date, dosage form, and herbal powder include color, odor, taste, and homogeneity.(Zamzam *et al*.,, 2022)

3. Research Design

   Each MC was studied using a separate chromatographic system because each had a mobile phase with the best polarity to develop the MC. In each TLC system, 3 solutions were bottled: solution A containing uric acid herbal medicine samples, solution B

containing uric acid jamu samples plus MCs, and solution C, which are the respective reference standards. To prepare solutions A and B for each MC, pre-treatment with different uric acid jamu samples was carried out. This pretreatment aims to completely extract the MC extract from the herbal preparation. The stationary phase used was the same, namely silica gel GF254, with the same detection method using UV light at 254 nm.

4. Preparation of Solution
   a. Identifies Allopurinol
      1) Preparation of test solution (A)

      Sample was put into a 250 ml Erlenmeyer flask, and 50 mL of a mixture of 6N ammonium hydroxide: 1N sodium hydroxide (9:1) was added and shaken for 30 minutes. The mixture was filtered, and the filtrate was evaporated to dryness in a water bath at approximately 70 °C. The residue was then dissolved in methanol (10 ml of methanol (Indonesian Pharmacopoeia, 5th ed, 2014).

      2) Preparation of test solution plus allopurinol (B)

      Sample was put into a 250 ml Erlenmeyer flask, one 100 mg allopurinol tablet was added, and the mixture was stirred until homogeneous. A mixture of ammonium hydroxide 6N: sodium hydroxide 1N (9:1) was much to 50 ml and shaken for 30 minutes. The mixture was filtered, and the filtrate was evaporated to dryness in a water bath at approximately 70 °C. The residue was then dissolved in methanol (10 ml of methanol (Indonesian Pharmacopoeia, 5th ed, 2014)

      3) Preparation of allopurinol standard solution (C)

      Five 100 mg allopurinol tablets were finely crushed, dissolved in 6N ammonium hydroxide solution in a 100 ml volumetric flask to the limit, filtered, and the filtrate was placed in a vial (Umamah, 2022)

   b. Identification for Piroxicam
      1) Preparation of test solution (A)

      Sample was put into a 250 mL Erlenmeyer flask, and then 50 mL of distilled water was added and shaken homogeneously. The mixture was adjusted to pH by adding 1 N sodium hydroxide solution to pH 10-11, then shaken for 30 minutes. The mixture was filtered and acidified with 1N hydrochloric acid solution to a pH of 1-2. The mixture was then shaken in a separatory funnel with 20 mL of ether 3 times. The ether fraction was then collected and dried in a water bath. The residue was dissolved with 8 mL of 96% ethanol and put into a vial (Zamzam *et al.*,, 2022).

      2) Preparation of test solution plus piroxicam (B)

      Sample was put into a mortar, one 10 mg piroxicam tablet was pulverized, and the mixture was crushed until homogeneous. The mixture was placed in a 250 mL Erlenmeyer flask, and then 50 mL of distilled water was added and shaken. The mixture was adjusted to pH by adding 1 N sodium hydroxide solution to pH 10-11, then shaken for 30 minutes. The mixture was then filtered into a 100 mL Erlenmeyer flask and acidified by adding 1 N hydrochloric acid to pH 1-2. The mixture was then shaken in a separatory funnel with 20 mL of ether 3 times. The ether fraction was collected and evaporated in a water bath prior to drying. The residue was dissolved with 8 mL of 96% ethanol and put into a vial (Zamzam *et al.*,, 2022).

      3) Preparation of standard solution of piroxicam comparator (C)

      One 10 mg crushed piroxicam tablet was placed into a 25 mL volumetric flask, 96% ethanol was added, shaken, and sonicated for 10 min. The mixture was filtered and the filtrate was placed in a vial (Zamzam *et al.*,, 2022).

c. Identification of Dexamethasone
   1) Preparation of test solution (A)
      Sample was put into a 250 ml Erlenmeyer flask, 30 ml of chloroform-methanol mixture (9:1) was added, and the mixture was shaken for approximately 30 minutes. The mixture was filtered, and the filtrate was evaporated in a water bath at approximately 70°C until it dried. The residue was dissolved in 5 ml of methanol and placed in vials (Ditjen POM, 1995).
   2) Preparation of test solution plus dexamethasone (B)
      Sample that had been added with 5 mg dexamethasone, which was crushed homogeneously first, then put into a 250 ml Erlenmeyer flask, 30 ml of chloroform-methanol mixture (9:1) was added, and shaken for about 30 minutes. The mixture was filtered, and the filtrate was evaporated in a water bath at approximately 70°C until it dried. The residue was dissolved in 5 ml of methanol and placed in vials (Ditjen POM, 1995).
   3) Preparation of dexamethasone standard solution (C)
      A quantity of dexamethasone tablets equivalent to 10 mg that had been crushed was dissolved in 10 ml of methanol, then filtered and the filtrate was put into a vial (Ditjen POM, 1995).

5. Preparation of Silent Phase and Mobile Phase
   a. Stationary Phase
      GF254 nm silica gel plates were cut to a size of 4 × 10 cm, then the KLT plates were activated using an oven at 105° for 30 minutes. Then the plate was marked with a lower limit of 1.5 cm and a creepage distance of 8 cm (Zamzam *et al.*,, 2022)
   b. Mobile Phase for Identification of Allopurinol
      Then, 200 ml of n-butanol and 200 ml of 6N ammonium hydroxide were mixed and shaken using a separatory funnel; the lower layer was discarded and the upper layer was taken, from the upper layer (25 ml), and n-butanol (2.5 ml of n-butanol and ethanol (5 ml of ethanol were added (Indonesian Pharmacopoeia, 5th ed, 2014).
   c. Mobile Phase for Identification of Piroxicam
      Ethyl acetate (60 mL), methanol (30 mL), and ammonia (10 mL) were placed in Erlenmeyer flasks and shaken until homogeneous (Zamzam *et al.*,, 2022).
   d. Mobile Phase for Identification of Dexamethasone
      10 milliliters of chloroform was placed in an Erlenmeyer flask, 40 ml of acetone was added, and the mixture was shaken (Ditjen POM, 1995).

6. Identification of Allopurinol, Piroxicam, and Dexamethasone in uric acid jamu by TLC
   Identification of allopurinol, piroxicam, and dexamethasone was carried out in TLCtools for each medical compound that had been saturated using the respective mobile phases. The stationary phase used was silica gel GF 254 with a size of 4 cm × 10 cm. After the chromatogram was developed, it was recorded and detected using UV light at 254 nm, and the Rf value of each spot that appeared on each chromatogram was calculated (Zamzam *et al.*,, 2022)

Data Analysis

The obtained data will be processed and analyzed to obtain data that are easy to understand. The steps that will be taken are as follows:

1. Compiled data were obtained in the form of organoleptic observations and thin-layer chromatography.
2. The obtained data are displayed in tabular form.
3. Analysis of spots and Rf values. In this research, the results are considered positif for containing medical compound if the Rf value of sample spot (solution A) is the same or has a difference of less than 10% from the Rf value of the spot in Solution B, which has

been confirmed with the Rf value of the spot in the reference standard solution (solution C)

4. Summary of research results. (Zamzam *et al.*,, 2022)

RESULTS AND DISCUSSION

Sampling

Sampling was carried out using the simple random sampling method which was carried out randomly. From the survey results in Kedawung District, Cirebon Regency, West Java, Indonesia there were eleven jamu samples were obtained from different producers. Then, 5 samples were randomly selected for examination.

Organoleptic Observation

Observations of packaging and organoleptic examinations yielded the following results:

Table I. Organoleptical Observation Results of Samples

Parameter	Sample				
	I	II	III	IV	V
Packaging	Sachet	Sachet	Sachet	Sachet	Sachet
No.*Batch*	-	-	-	-	-
Registration Number	POM TR.062 355 311	POM.TR. 043 230 761	TR.No. 003 202 171	POM TR NO: 083 601 312	POM TR. 083 275 091
Production Address	Indonesia	Middle Java	Indonesia	Tangerang	Indonesia
Exp.Date	-	-	-	-	01-03-28
Preparation	Powder	Powder	Powder	Powder	Powder
Color	Yellow	Yellow	Brownish yellow	Yellow	Brownish yellow
Smell	Typical jamu	Typical jamu	Typical jamu	Typical jamu	Typical jamu
Flavor	Bitter	Bitter	Bitter	Bitter	Bitter
Homogeneity	Homogeneous	Homogeneous	Homogeneous	Homogeneous	homogeneous

From the results of the organoleptic test on the five herbal medicine samples to be studied, all included a registration number on the packaging. However, after checking the correctness of the registration on the The Indonesian Food and Drug Authority website (https:cekbpom.pom.go.id/), it was found that the 5 samples of uric acid jamu were not registered with The Indonesian Food and Drug Authority .

Results of the Identification of Allopurinol in Uric Acid Jamu by TLC

The chromatogram results of allopurinol identification in uric acid jamu are presented in **Figure 1**. The distance from the center of each spot to the starting point is calculated, and then the Rf and hRf values of each spot are determined. The color of the spots visible under UV light at 254 nm is also recorded. The calculation results of Rf and hRf for each chromatogram from each sample are presented comprehensively in **Table II**.

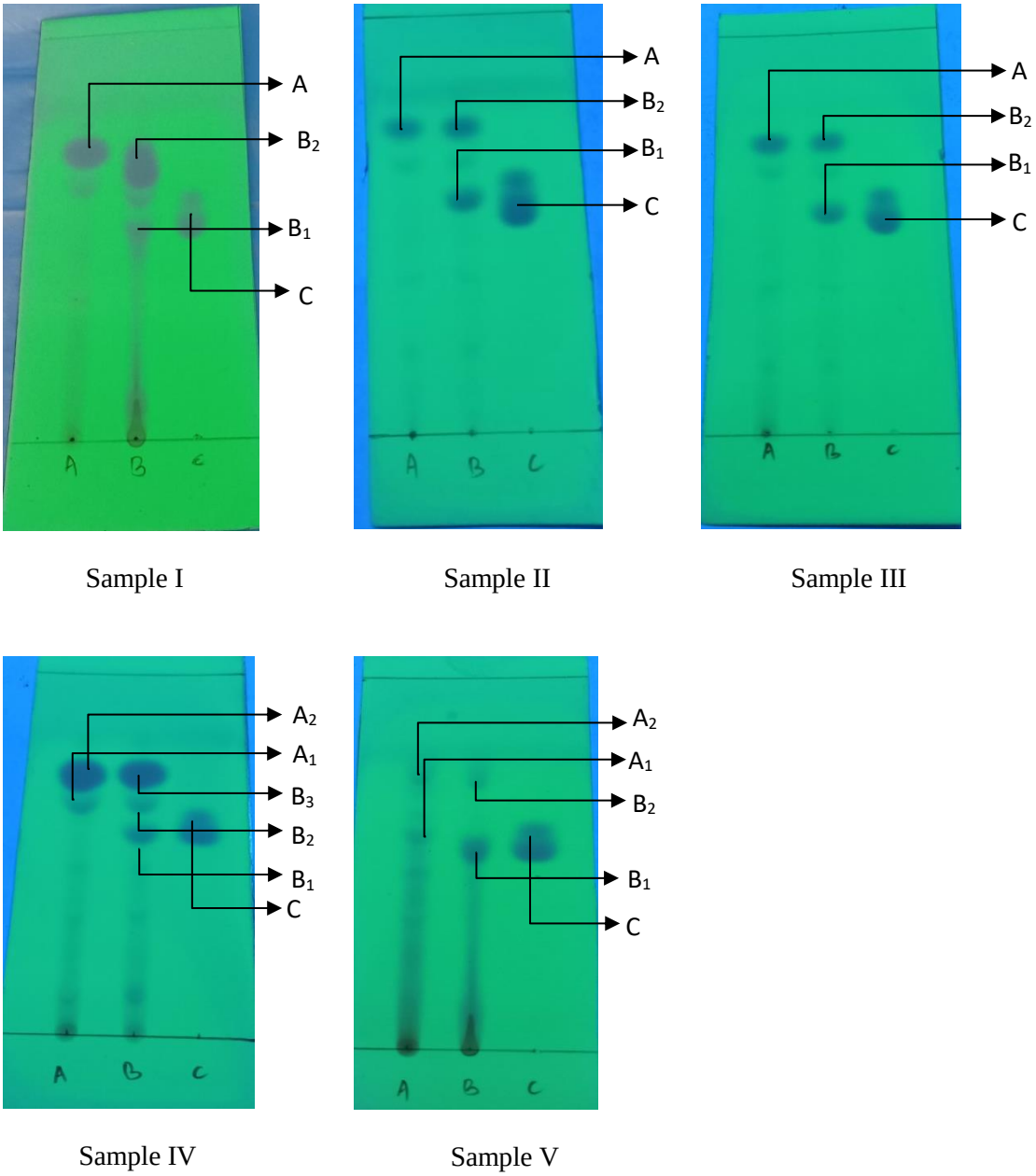

Figure 1. Chromatogram of Results of Allopurinol Identification in Uric Acid Jamu by TLC

Description:
A : Test solution (sample)
B : Test solution + allopurinol
C : Reference standard solution of allopurinol
A, A_1, A_2, B_1, B_2, B_3, C : spots on chromatogram.

Table II. Results of Allopurinol Identification in Uric Acid Jamu by TLC

Sample	Solution	Spot	X (cm)	Y (cm)	Rf	hRf	Spot Color	Conclusion
I	A	A	5,4	8	0.68	68	Purple	Negative
	B	B1	4.0	8	0.50	50	Purple	
		B2	5.1	8	0.64	64	Purple	
	C	C	4.1	8	0.51	51	Purple	
II	A	A	5.7	8	0.71	71	Purple	Negative
	B	B1	4.2	8	0.53	53	Purple	
		B2	5.7	8	0.71	71	Purple	
	C	C	4.3	8	0.54	54	Purple	
III	A	A	5.6	8	0.70	70	Purple	Negative
	B	B1	4.1	8	0.51	51	Purple	
		B2	5.6	8	0.70	70	Purple	
	C	C	4.2	8	0.53	53	Purple	
IV	A	A1	4.7	8	0.59	59	Purple	Negative
		A2	5.5	8	0.69	69	Purple	
	B	B1	4.2	8	0.53	53	Purple	
		B2	4.8	8	0.60	60	Purple	
		B3	5.0	8	0.63	63	Purple	
	C	C	4.3	8	0.54	54	Purple	
V	A	A1	4.4	8	0.55	55	Purple	Positive
		A2	5.8	8	0.73	73	Purple	
	B	B1	4.2	8	0.53	53	Purple	
		B2	5.7	8	0.71	71	Purple	
	C	C	4.2	8	0.53	53	Purple	

Description:
Solution A : Test solution (sample)
Solution B : Test solution + allopurinol
Solution C : Reference standard solution of allopurinol
X : Distance of the spot center point from the starting point
Y : Distance of front line from the starting point
Rf : Retardation Factor (X/Y)
hRf : Hundred Retardation Factor (100 Rf)

From the table above, it can be observed that one sample of uric acid jamu, namely Sample V, tested positive for the presence of allopurinol. In sample V, the Rf value of the sample is 0.55, while the Rf value of Solution B is 0.53. The difference in Rf values is 3.8%. Since the difference in Rf values is less than 10%, both spots are identified as allopurinol. Therefore, sample V is confirmed to be positive for the presence of allopurinol.

From the table above, it can be observed that Sample I, II, III, and IV tested negative for the presence of allopurinol. This is indicated by the Rf values of each sample, which are 0.68, 0.71, 0.70, and 0.59, respectively. These values have a difference in Rf greater than 10% when compared to the Rf values of Solution B for each sample, which are 0.50, 0.53, 0.51, and 0.53, respectively. In Sample I, the difference in Rf between the sample and Solution B is 36%, in sampel II, it is 44.0%, in Sample III, it is 37.3%, and in Sample IV, it is 11.3%.

Based on research conducted by (Fauziah & Maisura, 2019) on the identification of counterfeit drugs circulating in the Aceh market, out of three tested samples of uric acid herbal medicine, one sample tested positive for allopurinol with an Rf of 0.56. Similarly, (Rahmatullah *et al.*, 2018) conducted a study on the analysis of counterfeit drugs in herbal medicine in Pekalongan Regency, Middle Java, Indonesia. Out of six tested herbal medicine samples, three samples tested positive for allopurinol with an Rf of 0.61. Furthermore,

(Umamah 2022) conducted research on the identification of allopurinol in herbal medicine in Kejaksan District, Cirebon Regency, West Java, Indonesia. Out of five tested herbal medicine samples, four samples of uric acid herbal medicine tested positive for allopurinol with an Rf of 0.60.

From the result above, it can be concluded that out of the five samples examined, one samples tested positive for the presence of allopurinol, namely Sample V. Meanwhile, samples I, II, III, and IV tested negative for the presence of allopurinol."

Results of the Identification of Piroxicam in Uric Acid Jamu by TLC

The chromatogram results of piroxicam identification in uric acid jamu are presented in **Figure 2**. The distance from the center of each spot to the starting point is calculated, and then the Rf and hRf values of each spot are determined. The color of the spots visible under UV light at 254 nm is also recorded. The calculation results of Rf and hRf for each chromatogram from each sample are presented comprehensively in **Table III**.

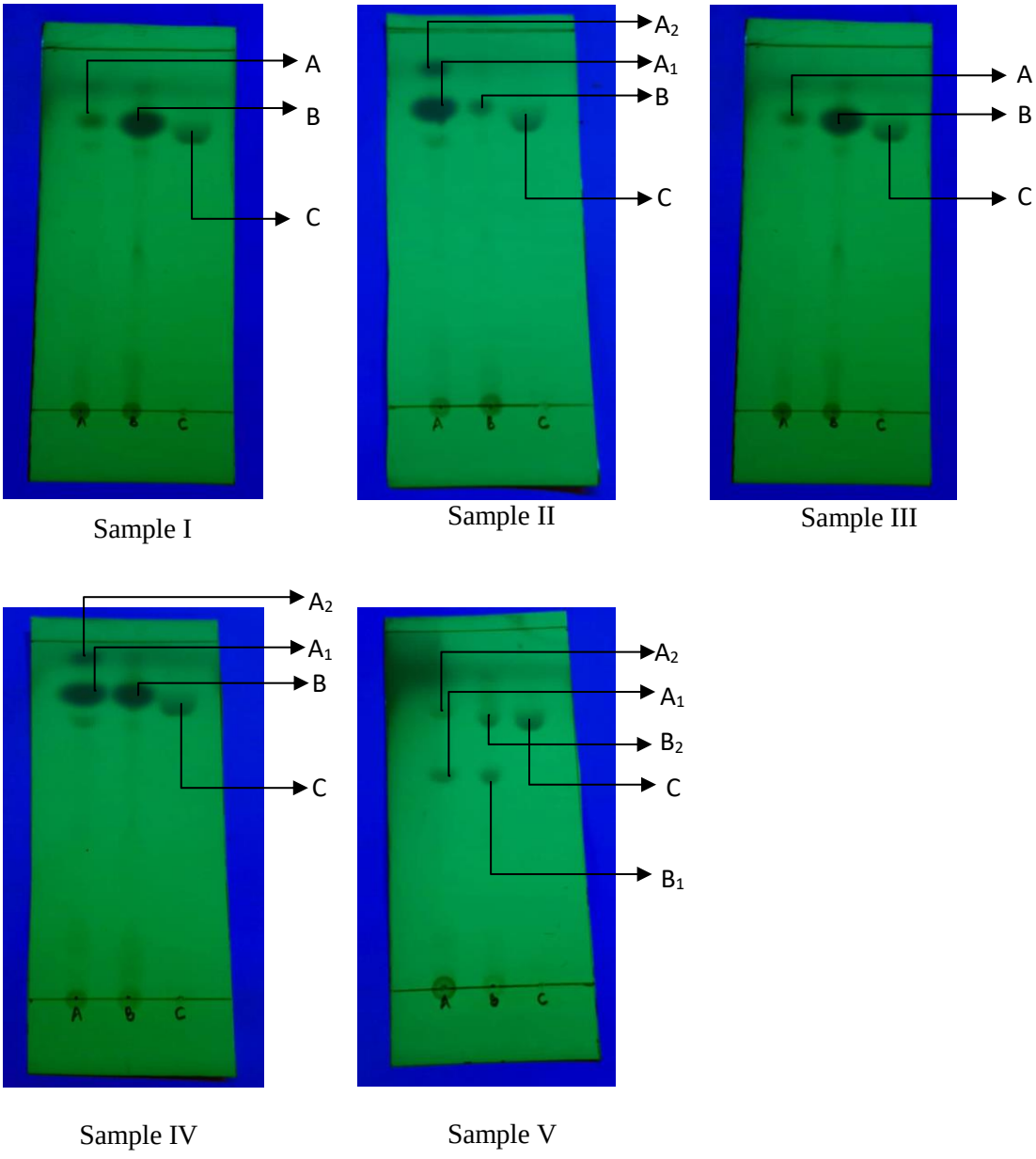

Figure 2. Chromatogram of Results of Piroxicam Identification in Uric Acid Jamu by TLC

Description:
A : Test solution (sample)
B : Test solution + piroxicam
C : Reference standard solution of piroxicam
A, A_1, A_2, B_1, B_2, B_3, C : spots on chromatogram.

Table III. Results of Piroxicam Identification in Uric Acid Jamu by TLC

Sample	Solution	Spot	X (cm)	Y (cm)	Rf	hRf	Spot Color	Conclusion
I	A	A	6.4	8	0.80	80	Purple	
	B	B1	6.4	8	0.80	80	Purple	Positive
	C	C	6.2	8	0.78	78	Purple	
II	A	A1	6.2	8	0.78	78	Purple	
		A2	7.2	8	0.90	90	Purple	Positive
	B	B	6.2	8	0.78	78	Purple	
	C	C	6.1	8	0.76	76	Purple	
III	A	A1	6.1	8	0.76	76	Purple	
	B	B	6.0	8	0.75	75	Purple	
	C	C	6.0	8	0.75	75	Purple	
IV	A	A1	6.8	8	0.85	85	Purple	
		A2	7.7	8	0.96	96	Purple	Positive
	B	B	6.8	8	0.85	85	Purple	
	C	C	6.6	8	0.83	83	Purple	
V	A	A1	4.6	8	0.58	58	Purple	
		A2	6.0	8	0.75	75	Purple	
	B	B1	4,6	8	0.58	73	Purple	Positive
		B2	5.9	8	0.74	74	Purple	
	C	C	5.8	8	0.73	73	Purple	

Description:
Solution A : Test solution (sample)
Solution B : Test solution + piroxicam
Solution C : Reference standard solution of piroxicam
X : Distance of the spot center point from the starting point
Y : Distance of front line from the starting point
Rf : Retardation Factor (X/Y)
hRf : Hundred Retardation Factor (100 Rf)

From the table 3, it can be seen that all samples, including Sample I, II, III, IV, and V, tested positive for the presence of piroxicam. In samples I, II, and IV, the Rf values of the samples are the same as the Rf value of Solution B, which are 0.80, 0.78, and 0.85, respectively. Therefore, it can be concluded that samples I, II, and IV test positive for the presence of piroxicam. Sample III and Sample V, tested positive for the presence of piroxicam. Each sample exhibited an Rf value of 0.76 and 0.75, respectively, with a difference in Rf of less than 10% when compared to the Rf value of Solution B for each sample, which were 0.75 and 0.74. In Sample I, the difference between the Rf value of the sample and the Rf value of Solution B is 1,3%, while in Sample V, the difference between the Rf value of the sample and the Rf value of Solution B is 1,4%." Based on the study by Rahmatullah *et al.,* (2018), qualitative analysis of counterfeit drugs in uric acid herbal medicine in Pekalongan Regency, Middle Java, Indonesia, revealed that out of the 6 samples tested, one sample tested positive for the presence of piroxicam with an Rf value of 0.68.

From the discussion above, it can be concluded that all five examined uric acid jamu samples tested positive for the presence of piroxicam.

Results of the Identification of Dexamethason in Uric Acid Jamu by TLC

The chromatogram results of dexamethasone identification in uric acid jamu are presented in **Figure 3**. The distance from the center of each spot to the starting point is calculated, and then the Rf and hRf values of each spot are determined. The color of the spots visible under UV light at 254 nm is also recorded. The calculation results of Rf and hRf for each chromatogram from each sample are presented comprehensively in **Table IV**.

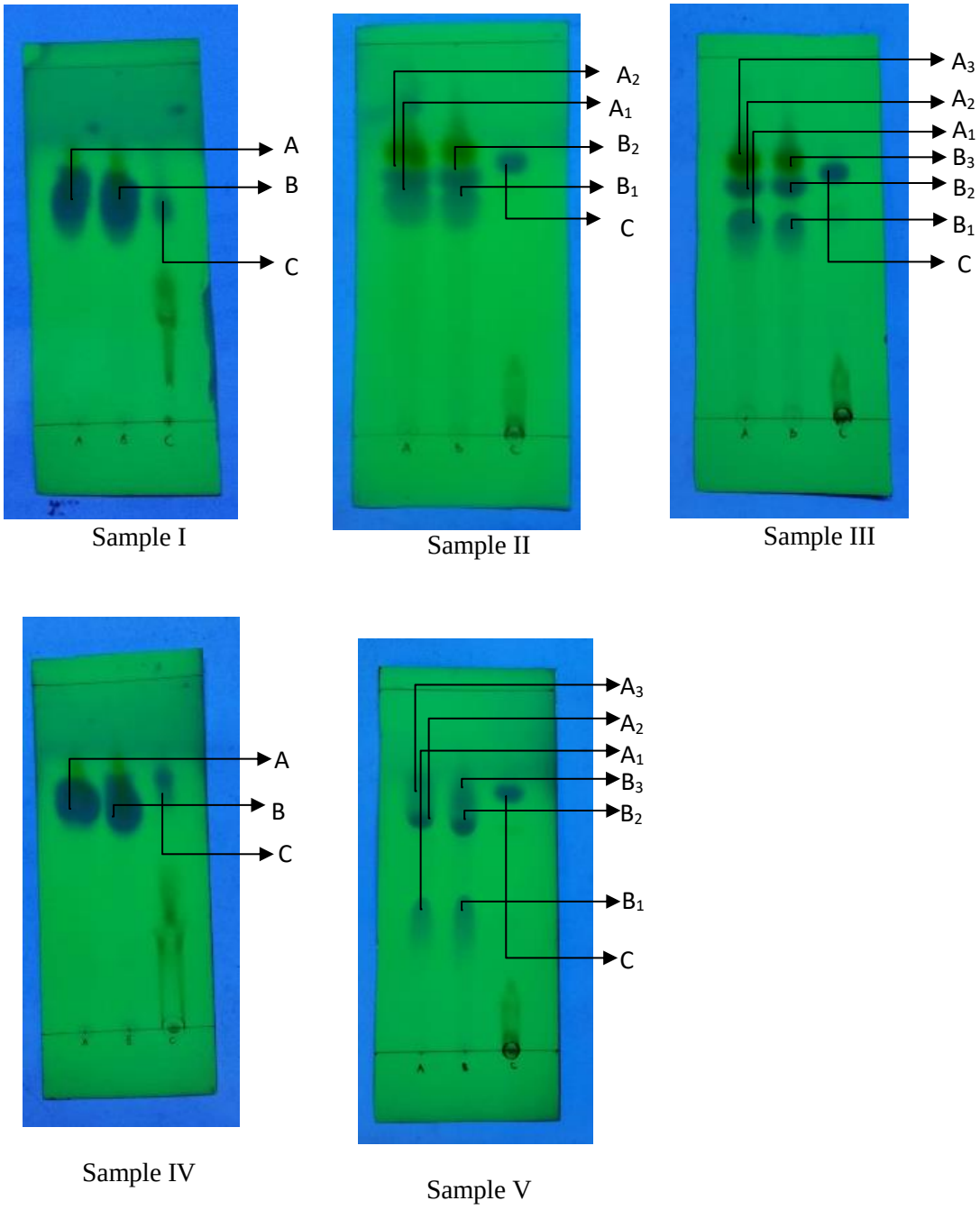

Figure 3. Chromatogram of Results of Dexamethasone Identification in Uric Acid Jamu by TLC

Description:
A : Test solution (sample)
B : Test solution + dexamethasone
C : Reference standard solution of dexamethasone
A, A_1, A_2, B_1, B_2, B_3, C: spots on chromatogram.

Table IV. Results of Identification of Dexamethasone in Uric Acid Herbs by KLT

Sample	Solution	Spot	X (cm)	Y (cm)	Rf	hRf	Spot Color	Conclusion
I	A	A	5.1	8	0.64	64	Purple	Positive
	B	B	4.8	8	0.60	60	Purple	
	C	C	4.7	8	0.59	59	Purple	
II	A	A1	5.2	8	0.65	65	Purple	Positive
		A2	6.0	8	0.75	75	Purple	
	B	B1	5.1	8	0.64	64	Purple	
		B2	6.1	8	0.76	76	Purple	
	C	C	5.8	8	0.73	73	Purple	
III	A	A1	4.2	8	0.53	53	Purple	Positive
		A2	4.9	8	0.61	61	Purple	
		A3	5.5	8	0.69	69	Purple	
	B	B1	4.1	8	0.51	51	Purple	
		B2	4.9	8	0.61	61	Purple	
		B3	5.6	8	0.70	70	Purple	
	C	C	5.3	8	0.66	66	Purple	
IV	A	A	5.2	8	0.65	65	Purple	Positive
	B	B	5.2	8	0.65	65	Purple	
	C	C	5.6	8	0.70	70	Purple	
V	A	A1	3.2	8	0.40	40	Purple	Positive
		A2	5.1	8	0.64	64	Purple	
		A3	6.0	8	0.75	75	Purple	
	B	B1	3.2	8	0.40	40	Purple	
		B2	4.9	8	0.61	61	Purple	
		B3	5.7	8	0.71	71	Purple	
	C	C	5.7	8	0.71	71	Purple	

Description:
Solution A : Test solution (sample)
Solution B : Test solution + dexamethasone
Solution C : Reference standard solution of dexamethasone
X : Distance of the spot center point from the starting point
Y : Distance of front line from the starting point
Rf : Retardation Factor (X/Y)
hRf : Hundred Retardation Factor (100 Rf)

From **Table IV**, it is evident that the Rf values for the standard dexamethasone solution (Solution C) in samples II and V are approximately the same. These Rf values are significantly different from the Rf values of Solution C for samples I, III, and IV. However, despite the differences in the chromatographic systems for each sample, the chromatograms for each sample can be inferred based on the Rf values of the sample solution, Solution B,

and the standard dexamethasone solution for each respective sample. This difference may be attributed to the saturation levels of each TLC chambers.

From Table 4, it is apparent that all samples, including samples I, II, III, IV, and V, tested positive for the presence of dexamethasone. In samples III and IV, the Rf values of the samples are the same as the Rf value of Solution B, which are 0.61 and 0.65, respectively. Therefore, it can be concluded that samples III and IV test positive for the presence of dexamethasone.

From Table 4, it can be observed that Sample I, II, and V tested positive for the presence of allopurinol. This is indicated by the Rf values of each sample, which are 0.64, 0.75, and 0.75, respectively. These values have a difference in Rf less than 10% when compared to the Rf values of Solution B for each sample, which are 0.60, 0.76, and 0.71, respectively. In Sample I, the difference in Rf between the sample and Solution B is 6,7%, in sampel II, it is 1,3%, and in Sample V, it is 5,6%.

Based on the research conducted by Pratiwi (2022), out of the 4 samples examined, all tested positive for the presence of dexamethasone with respective Rf values of 0.57, 0.63, 0.66, and 0.61. In a study by Wulansari (2018), out of the 3 samples examined, it was found that 2 samples tested positive for the presence of dexamethasone with the same Rf value of 0.72.

From the discussion above, it can be concluded that all five examined uric acid jamu samples tested positive for the presence of dexamethasone.

CONCLUSIONS

Based on the results of research on the identification of allopurinol, piroxicam, and dexamethasone in uric acid jamu by TLC, of the 5 (five) samples of uric acid jamu identified, one samples were positive for allopurinol, and all samples were positive for piroxicam and dexamethasone.

REFERENCES

Astuti, W., Prayoga, D., Firmansyah, H., & Renaldi, G. (2018). Hubungan Pola Makan Dengan Terjadinya Penyakit Gout (Asam Urat) Di Desa Limran Kelurahan Pantoloan Boya Kecamatan Taweli. *Jurnal E-Biomedik*, *7*(6), 134–147.

Ditjen POM. (1995). *Meode Analisis 95/96*. Depertemen Kesehatan RI.

Farmakope Indonesia Edisi V. (2014). *Farmakope Indonesia Edisi V*. Departemen Kesehatan Republik Indonesia.

Fauziah, & Maisura, R. (2019). Aceh terhadap Obat Tradisional Community Knowledge Review of Banda Aceh. *Tinjauan Pengetahuan Masyarakat Kota Banda Aceh Terhadap Obat Tradisional*, *03*(02), 129–136.

Minarsih & Padanun. (2021). Alanisis Natrium Diklofenak Dalam Sampel Jamu Pegal Linu yang Dijual di Kabupaten Semarang Secara KLT-Spektrofotometri Uv-Vis. *Journal of Holistics and Health Sciences*, 3 (2),163-175.

Permenkes RI. (2012). Registrasi Obat Tradisional. *Permenkes RI*, *Kolisch 1996*, 49–56.

Pertamawati, M. H. (2015). Uji penghambatan aktivitas enzim xantin oksidase terhadap ekstrak kulit kayu secang (*Caesalpinia sappan* L.). Karika-Jurnal Ilmiah Farmasi, 3(2), 12–17

Pratiwi, N. (2022). Identifikasi Deksametason Dalam Jamu Pegal Linu Yang Beredar Di Kecamatan Ciawigebang Kabupaten kuningan Secara Kromatografi Lapis Tipis. Cirebon. In *Karya Tulis Ilmiah*. Sekolah Tinggi Farmasi Muhammadiyah Cirebon

Rahmatullah, S., Slamet, & Fikri, A. (2018). Analisis Kualitatif Kandungan Bahan Kimia Obat (BKO) dalam Jamu Asam Urat yang Beredar di Kabupaten Pekalongan. *Urecol*, 566–575.

Roni, A., & Minarsih, T. (2021). Identifikasi Allopurinol dan Deksametason Dalam Jamu Secara Simultan Dengan Metode Kromatografi Lapis Tipis (KLT). *Indonesian Journal of Pharmacy and Natural Product*, *4*(2), 150–155.

Safitri, P.M. (2022) (*Literature Review*) Identifikasi Senyawa Allopurinol dan

Deksametason dalam Jamu Asam Urat Sediaan Serbuk secara Kromatografi Lapis Tipis. Repository Akademi Farmasi Surabaya

Saputra, S. (2015). Identifikasi Bahan Kimia Obat dalam Jamu Pegel Linu Seduh dan Kemasan yang Dijual di Pasar Bandar. Jurnal Wiyata, , *2*(2), 188–192.

Setiabudi, R. & Nafriadi, I. (2016). *Farmakologi dan Terapi Edisi 6*. FKUI, Jakarta

Umamah, A. O. (2022). *Identifikasi Allopurinol dalam Jamu Asam Urat yang Beredar di Kecamatan Kejaksan Kota Cirebon secara Kromatografi Lapis Tipis*. Sekolah Tinggi Farmasi Muhammadiyah Cirebon.

Wulansari, A. (2018). Identifikasi Deksametason Pada Jamu Pega Linu Yang Beredar Di Kota Cirebon Dengan Metode Kromatografi Lapis Tipis (KLT). In *Karya Tulis Ilmiah*. Sekolah Tinggi Farmasi Muhammadiyah Cirebon.

Zahra, F. (2018). Identifikasi Bahan Kimia Obat (BKO) Deksametason pada Jamu untuk Rematik Yang Beredar Di Pasaran. In *Skripsi* (Vol. 2, Issue 1, pp. 1–13). Sekolah Tinggi Farmasi Indonesia Yayasan Perintis Padang.

Zamzam, M. Y., Karlina, N., & Yesa, K. R. (2022). Identifikasi Bahan Kimia Obat Dalam Jamu Pegal Linu Yang Beredar Di Kecamatan Harjamukti Kota Cirebon. Medimuh, 3(2), 81–92.