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Identification of the Diclofenac Sodium in Jamu Pegal Linu Sold at Balonganggang Market, Gresik Regency

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Abstract

Jamu is one of tradisional medicine made from a mixture of natural ingredients in the form of plant materials, minerals, animals, and sarian (galenik) to be managed by making herbal preparations and has been used by the community for treatment for a long time and is usually made from generation to generation. Some Balongpanggang people believe that Jamu Pegal Linu relieves body aches and speeds up body recovery because Jamu Pegal Linu comes from natural ingredients and the addition of Medicinal Chemicals. The purpose of this study was to determine whether Jamu Pegal Linu sold in Balongpanggang Market contains Diclofenac Sodium. This type of research is experimental, namely by using the Thin Layer Chromatography (TLC) test method to determine the presence or absence of Diclofenac Nartium in Jamu Pegel Linu. The results showed that the sample of jamu pegal linu in sample A showed positive for Diclofenac Sodium, with the Rf value of sample A being 0.82. While samples B, C, D, E show negatively containing Diclofenac Sodium with each Rf value in samples B and E is 0.75 while samples C and D are 0.74.

Keywords: Jamu, Jamu Pegal Linu, Diclofenac Sodium, Thin Layer Chromatography

Introduction

Jamu is a traditional medicine made from natural ingredients that has been used for generations and is believed to be safe and effective in maintaining health and overcoming certain complaints (Ka. BPOM RI, 2019). However, the authenticity of herbal medicine is often tainted by irresponsible practices, namely the addition of medicinal chemicals to strengthen its efficacy. One of the medicinal chemicals that is often added is diclofenac sodium, which is a

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non-steroidal anti-inflammatory drug that has analgesic and anti-inflammatory effects (Tjay, 2015). Jamu pegal linu is one type of herbal medicine that is widely consumed by the community, especially physical workers such as farmers, because it is believed to be able to relieve muscle and joint pain at an affordable price. The high demand for this product encourages competition in the traditional medicine industry, so that some producers choose to add medicinal chemicals to make the effect feel faster, even though this practice is prohibited according to the Minister of Health Regulation No. 007 of 2012.

Research on the presence of diclofenac sodium in jamu pegal linu has been conducted. Nasution et al. (2022) examined samples of jamu pegal sciatica in Banjarmasin and did not find the presence of diclofenac sodium. In contrast, research by Tahir et al. (2018) in Makassar reported 3 out of 7 jamu brands were positive for diclofenac sodium. Similar results were found by Setyowati et al. (2019) in Pekalongan, where 6 out of 14 samples were detected positive, as well as research by Dewi et al. (2019) in Subang which showed that 3 out of 10 samples of rheumatic herbal medicine also contained diclofenac sodium. This difference results shows that addding medicinal chemicals in herbal medicine is still a serious problem and needs attention. Especially in supervision and regulation. Based on this background, this study aims to identify the presence or absence of diclofenac sodium content in jamu pegal linu circulating in Balongpanggang Market, Gresik Regency using the Thin Layer Chromatography (TLC) method.

Material and Methods

This research was conducted at the Chemistry and Biology Laboratory, Pharmacy Study Program, Faculty of Health, Muhammadiyah University of Gresik.

Tools and Materials

The tools used in this study are chromatography chamber / vessel, silica gel GF 254 TLC plate, filter paper, aluminum foil, capillary pipe, 10 ml volumetric flask, 50 ml beaker glass, 10 ml and 50 ml measuring cups, water bath, porcelain dish, stirring rod, vial bottle, drying equipment, analytical balance, dropper pipette, UV lamp 254 nm.

The materials used were A, B, C, D and E sciatica herbal medicine samples, sodium diclofenac standard comparison, ethyl acetate, n-Hexane, 96% ethanol.

Tabel 1. Sample Criteria for Jamu Pegal Linu

No	Sample	Dosage Form	BPOM Registration Number

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1	Sample A	Sachet Powder	POM TR. 993 299 922
2	Sample B	Sachet Powder	POM TR. 193 223 451
3	Sample C	Sachet Powder	POM TR. 082 281 391
4	Sample D	Sachet Powder	POM TR. 102 219 821
5	Sample E	Sachet Powder	POM TR. 072 271 541

Research Procedure

1. **Organoleptic Test**

   Organoleptic test is done by observing directly using human senses as the main tool. The jamu pegal linu sample is placed in a container and then observed for shape, color, smell, and taste (Setyowati et al., 2022).

2. **TLC test**

   a. **Preparation of Test Solution (Sample A, B, C, D, and E)**

      Weighed 10 grams of herbal medicine sample, added 96% ethanol 50 ml them extracted by maceration method. The extrac were filtered with filter paper, after filtering it was poured into porcelain dish. Then the filtrate was evaporated on a water bath to form a viscous extract. The viscoused extract was added with 10 ml of 96% ethanol and filtered again using filter paper (Wahyuningsih et al., 2021).

   b. **Preparation of Comparator Standard Solution**

      Weighed 10 mg of diclofenac sodium was put into a 10 ml volumetric flask, then dissolved with 96% ethanol to 10 ml (Nasution et al. 2022).

   c. **Preparation of Mobile Phase**

      The mobile phase used is Ethyl Acetate: n-Hexane (7:3). The method of manufacture is 7 ml of ethyl acetate and 3 ml of n-hexane, then mixed until homogeneous. Put into the chamber to be saturated (Wahyuningsih et al., 2021).

   d. **Preparation of Stationary Phase**

      The stationary phase used is silica gel GF 254 TLC plate. Prepare a TLC plate with a size of 5x10 cm then mark the bottling place / lower limit line which is 1 cm from the bottom edge of the plate and marked the upper limit line with a distance of 1 cm from the top edge of the plate.

   e. **How Thin Layer Chromatography Works**

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Prepare a clean and dry chamber. Pour 10 ml of eluent Ethyl acetate: n-Hexane (7:3) Add filter paper soaked in eluent in the chamber as saturation of eluent vapor. Close the chamber and leave for 15 minutes before use. Comparative Standard Solution of Diclofenac Sodium and Sample Solution of Jamu Pegal Linu A, B, C, D, and E were each photographed on the starting line of the plate from the edge of the plate with a distance of 1 cm using a capillary tube. Then, the plate is inserted into the chamber that has been saturated with eluent, then the chamber is closed and leave for a while until the eluent rises to the upper limit of the layer. The plate is lifted and then dried. Place the plate under UV light with a wavelength of 254 nm, then mark the spot. Calculate the Rf price for each spot with the formula:

$$Rf = \frac{Distance\ traveled\ by\ sample/standard}{Distance\ traveled\ during\ the\ motion\ phase}$$

Result and Discussion

Organoleptic Test

The samples used in this study amounted to 5 samples of jamu pegal linu with different brands sold at Balongpanggang Market, Gresik Regency. Organoleptic tests are carried out by observing directly using the five senses to determine the dosage form, color, taste and smell of herbal medicine samples (Setyowati et al., 2022).

Organoleptic tests on the herbal medicine samples showed variations in color, taste, and aroma which were influenced by the composition of herbal ingredients. The color of the samples varied from orange yellow, light brown, yellowish brown, to brownish yellow. This difference is mainly influenced by the presence of turmeric which contains curcumin as a natural yellow dye as well as ginger and cinnamon which give brown shades (Harahap et al., 2021). In terms of flavor, the samples generally had a distinctive bitter taste, mainly derived from the active compounds of temulawak and turmeric such as essential oils and curcuminoids. Variations in taste were also found, such as bitter-tart, bitter-spicy due to gingerol in ginger, and sweet-bitter-spicy combinations that were thought to be influenced by the addition of sugar or natural sweeteners (Lestari et al., 2021). All samples showed a distinctive aroma of spices that characterize traditional Indonesian herbal medicine, with the dominance of ginger and clove aromas that provide a strong sensory impression and support consumer acceptance (Amin et al., 2024). Overall, these organoleptic variations reflect differences in formula and proportion of ingredients between products, but are still in accordance with the general characteristics of jamu pegal linu, which is yellow-brown in color, has a dominant bitter taste, and has a

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distinctive spice aroma. The results of the organoleptic test observations present in Table 2 below:

Tabel 2. Organoleptic Test Results

No	Sample	Shape	Color	Taste	Odor
1	Sample A	Powder	Light orange yellow	Bitter	Characteristic aroma of spices
2	Sample B	Powder	Slightly pale light brown	Bitter and slightly astringent	Characteristic aroma of spices
3	Sample C	Powder	Yellowish brown	Bitter dan slightly spicy	Characteristic aroma of spices
4	Sample D	Powder	Yellow-brown	Sweet, slightly Bitter dan slightly spicy	Characteristic aroma of spices
5	Sample E	Powder	Yellowish brown	Bitter	Characteristic aroma of spices

Thin Layer Chromatography (TLC) Test

This study was conducted using the Thin Layer Chromatography (TLC) method to determine the presence of diclofenac sodium content in 5 samples of jamu pegal linu sold in Balongpanggang Market, Gresik Regency. The mobile phase used is ethyl acetate: N-hexane (7:3). The use of a mixture of N-hexane and ethyl acetate aims to adjust the polarity of the eluent. Because diclofenac sodium is polar, elution with eluent with moderate polarity will form a clear and well-separated spot (Rosyanda et al., 2019). The results of the TLC test observations can be seen in Table 3 below:

No	Sample	Solven distance (cm)	Spot distance (cm)	Rf price	Spot color	Result
1	Comparator Standard Solution (Diclofenac Sodium)	8	6,5	0,81	Dark Blue	+
2	Sample A	8	6,6	0,82	Dark Blue	+
3	Sample B	8	6	0,75	Dark Blue	-
4	Sample C	8	5,9	0,74	Dark Blue	-

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5	Sample D	8	5,9	0,74	Dark Blue	-
6	Sample E	8	6	0,75	Dark Blue	-

Table 3. Results of 5 Sampels of Jamu Pegal Linu

The KLT test listed in Table 3 aims to identify the presence of diclofenac sodium compounds in several samples by comparing the Rf (*Retardation Factor*) value of each sample against the standard comparison solution. The results of Thin Layer Chromatography (TLC) tests on five samples of jamu pegal linu showed that only one sample Sample A was positive for diclofenac sodium, with an Rf value of 0.82 which is close to the standard solution of 0.81 and has the same dark blue spot color. Meanwhile, samples B, C, D, and E had lower Rf values, so they were declared negative even though they showed similar spot colors.

Blue or purple spots that appear on the plate without the addition of reagents are due to the intrinsic fluorescence of diclofenac sodium when illuminated by UV (Rosyada et al., 2019), while yellow spots come from curcumin or curcuminoid pigments in turmeric or temulawak (Ramdan et al., 2024). The suitability of the Rf value with the standard solution is an indicator of the presence of medicinal chemical, where the difference of less than 0.05 is positive, while more than 0.05 is negative (Saputri et al., 2017). The Thin Layer Chromatography (TLC) result can be influenced by the composition of the stationary phase, solvent compatibility, the amount of extract, and visualization techniques (Saifudin, 2011).

These results confirm that the addition of diclofenac sodium to herbal medicine can cause serious side effects, such as gastrointestinal bleeding and gastric ulceration (Nata et al., 2022), although this substance has anti-inflammatory and analgesic properties (Setyowati et al., 2022). In contrast, herbal ingredients such as chili, ginger and temulawak are known to have relatively safe natural anti-inflammatory and analgesic activities (Arel, 2023). Of the five samples of jamu pegal linu sold in Balongpanggang Market, Gresik Regency, only one sample was detected positive for diclofenac sodium. If a herbal medicine product registered with BPOM is proven to contain medicinal chemical, BPOM has the authority to withdraw the product from circulation, carry out destruction, provide administrative sanctions, up to revocation of distribution permits and criminal proceedings according to regulations. Meanwhile, herbal medicine that is proven negative for medicinal chemical can continue to be supported as a product that meets the standards and is safe for consumption (Ka. BPOM RI, 2023).

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Conclusion

The results of the study can be concluded that the samples of jamu pegal linu in sample A have positive results containing the medicinal chemical diclofenac sodium while in samples B, C, D and E have negative results containing diclofenac sodium.

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