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Anti-Inflammatory and Analgesic Effect from Decoction of Itchy Leaves (*Laportea decumana* (Roxb.) Wedd.)

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ABSTRACT: Itchy leaves have the ability as analgesics, anti-inflammatory, asthma, antimalaria and antihypertension. Empirically in Maluku and Papua, itchy leaves are used topically to treat pain and inflammation. This study aims to examine the antiinflammatory and analgetic effects orally of an Itchy leaves decoction. Anti-inflammatory testing using the Winter method, rats were divided 5 groups negative control given aquadest, positive control given sodium diclofenac 1.8 mg/200 g BW rats, the test group given an infusion of itchy leaves dose 0.3 g/Kg BW (I), 0.6 g/Kg BW (I) and 1.2 g/Kg BW (III). Analgesics testing using Siegmund method, mice were divided 5 groups, negative control given aquadest, positive control given sodium diclofenac 0.26 mg/20 g BW mice, the test group given decoction of itchy leaves dose 0.4 g/Kg BW (I), 0.8 g/Kg BW (II) and 1.6 g/Kg BW (III). Results of Mann-whitney test, infusion of itchy leaves had a significant anti-inflammatory and analgesic effect on the negative control group, p value <0.05. Precentage of positive control edema inhibition and the test group dosage I, II, III was obtained by 27.94%; 15.97%; 25.89%; and 26.86%, percentage inhibition of positive control and the test group dosage I, II, III was obtained by 59.42%; 43.93%; 45.70% and 80.22%. Itchy leaves decoction has a lower anti-inflammatory effect than diclofenac sodium. The analgesics effect of decoction of Itchy leaves at doses of 0.4 g/Kg BW and 0.8 g/Kg BW was lower, dose of 1.6 g/Kg BW was higher than diclofenac sodium.

KEYWORDS: Analgesics, anti-inflammatory, Itchy leaves (*Laportea decumana* (Roxb.) Wedd.).

1. INTRODUCTION

Inflammation and pain are two health problems that are often felt by the general public. Synthetic drugs such as the NSAID group are used to treat these conditions, as are traditional medicines. One of the plants that is effective as an analgesics Itchy leaves. Itchy leaves is an endemic plant from eastern Indonesia that thrives in moist or areas with sufficient rainfall and contains chemical compounds from the alkaloid, glycoside and triterpenoid groups, as well as formic acid on the spines on the surface of the leaves, which have properties as analgesics. This plant has the characteristics of broad leaves with hairy or spiny leaf surfaces, characteristic of the Urticaceae family [1].

Rural communities in Maluku, Papua and surrounding areas call this plant Itchy leaves because when this part of the leaf touches the surface of the skin, it causes itching that lasts only a few minutes, then the itching disappears with reduced pain. In the Maluku and Papua regions, Itchy leaves is empirically used to treat mild to severe pain complaints such as pain, stiff joints, muscle aches, headaches, stomach aches and joint pains. Itchy leaves is also used to treat anti-inflammatory symptoms in the form of bruising and swelling caused by irritation from forest plants in the same family. The method of use is topical, where Itchy leaves are applied directly to the area of pain and inflammation [2]. This Itchy leaves has an analgesic effect, based on the results of research carried out on patients with myalgia and analgesic effects in ointment dosage forms. The study was limited to topical use and explained that the spines on the surface of the Itchy leaves contain formic acid, which has an analgesic effect [3].

In this study, a decoction is made because the content of formic acid and other active compounds can dissolve in water and has a boiling point of 101^0C [4], therefore to be expected that the preparation will have an anti-inflammatory effect and an analgesic effect.

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2. MATERIALS AND METHODS

2.1. Material

Itchy leaves (Laportea decumana (Roxb). Wedd), the results from Indonesian Institute of Sciences (LIPI) number B-971/IPH.3/KS/III/2019 plants determination is carried out to ensure the correct of the simplisia used in research. Animal trial used male rats Sprague Dawley (SD) aged 2-3 months with a body weight of 150-200 g, and male mice Deutche Denken Yoken (DDY) aged 2-3 months with a body weight of 25-30 g, Diclofenac sodium as a control positive, CMC sodium 0.5%, carrageenan 1%, acetic acid 3%, distilled water.

2.2. Methods

2.2.1 Preparation of the Itchy leaves decoction

Take 5 g of Itchy leaves, add 200 ml of water, heat to half of the original volume, stir from time to time and filter while hot to obtain a 100 ml decoction

2.2.2 Dosage determination of Itchy leaves decoction

The dose determination is based on the journal of anti-inflammatory and analgesic tests of Itchy leaves [5]. Itchy leaves decoction is made with 6 different doses 3 anti-inflammatory test doses are dose I 0.3 g/kg BW, dose II 0.6 g/kg BW, and dose III 1.2 g/kg BW, control positive given diclofenac sodium 1.8 mg/200 g BW, control negative given aquadest. Analgesic test doses of dose I 0.4 g/kg BW, dose II 0.8 g/kg BW and dose III 1.6 g/kg BW, control positive given diclofenac sodium 0.026 mg/200 g BW, control negative given aquadest. This study has obtained etchical approval by Universitas Veteran with number 2824/II/2019/KEPK.

2.2.3 Anti-inflamatory activity test

This study was conducted by giving decoction of Itchy leaves orally to mice, then made painful with 3% acetic acid intraperitoneally. Pain in mice is shown in the form of a writhing response, namely writhing and rubbing the abdomen to the bottom of the cage. The frequency of these movements within a certain time expresses the degree of pain felt by the mice [7].

2.2.4 Analgesic activity test

The test material was administered orally 30 minutes before intraperitoneal administration of 3% glacial acetic acid to the experimental animals. The dose of glacial acetic acid used was 10 mL/kg BW. Giving glacial acetic acid to cause pain in mice. The pain reaction is shown by the mice by writhing, rubbing the abdomen to the bottom of the cage. The amount of writhing was observed after 60 minutes with an interval of 5 minutes [7].

2.2.5 Statistical analysis

Data analysis was carried out using descriptive analysis with the calculation of the Area Under the Curve (DDK) with the percentage of rat udem inhibition and mice writhing inhibition, and using SPSS analysis of Kruskal-Wallis data and continued testing between groups of Mann-Whitney test.

3. RESULTS

3.1 Plant Determination

Itchy leaves used in this study came from the forest of Kamal Village, Ambon, Maluku. Plant determination was carried out at the Botany Research and Development Centre 'Herbarium Bogoriense', Biology Research Centre, LIPI, Cibinong. The determination results showed that the plants used in this study were Laportea decumana (Roxb.) Wedd). from the Urticaceae family.

3.2 Anti-inflammatory test

Table 1 shows that the average volume of rat paw edema shows that the test preparation can reduce the volume of rat paw edema at the third hour after carrageenan induction.

Tabel 1. Average decrease in rats paw volume.

Test Group	Average sole volume of the foot (mL)					
	Hour to-0	Hour to-1	Hour to-2	Hour to-3	Hour to- 4	Hour to-5
Control negative	0.92	1.66	2.00	2.23	1.99	1.84
Control positive	1.06	1.21	1.45	1.55	1.40	1.30
Dose I	1.16	1.56	1.77	1.67	1.51	1.38
Dose II	1.15	1.41	1.54	1.43	1.31	1.23
Dose III	1.17	1.38	1.55	1.39	1.27	1.21

Table 2 shows that the larger the value of the Area Under the Curve (DDK), the smaller the ability to reduce edema volume and if the smaller the DDK value, the greater the ability to reduce edema volume against anti-inflammatory drugs [8].

Table 2. Value DDK anti-inflammatory.

DDK Group	DDK1	DDK2	DDK3	DDK4	DDK5	Average DDK
Control negative	8.80	8.91	9.72	9.36	9.54	9.27
Control positive	6.32	6.63	7.74	6.73	6.97	6.68
Dose I	7.87	7.48	8.06	7.73	7.82	7.79
Dose II	6.94	6.77	7.06	6.51	7.05	6.87
Dose III	6.75	6.89	6.70	6.83	6.73	6.78

The research sample showed that the samples were normally distributed and not homogeneous. Kruskal Wallis test showed that there were significant differences between the test groups.

Table 3. Mann-Whitney test results of anti-inflammatory group

Group test	DDK	Control (-)	Control (+)	Dose I	Dose II	Dose III
Control negative	9.27					
Control positive	6.88	0.008*				
Dose I	7.79	0.008*	0.008*			
Dose II	6.87	0.008*	0.222	0.008*		
Dose III	6.78	0.008*	0.095	0.008*	0.310	

Notes: * there is a significant difference at the level of <0.05

Table 3. Mann-Whitney test results, there was a significant difference between each group. The results of DDK values in all treatment groups obtained, the negative control DDK value is higher than all test preparation groups. This proves that the Itchy leaves decoction test preparation group and the positive control have anti-inflammatory effects. The test preparation dose of 0.3 g/kg BW has the lowest DDK value when compared to other test preparation dose group, but has effectiveness as an anti-inflammatory.

3.3 Analgesic test

Table 4 shows the average number of writhing mice showed a decrease in the number of writhing at the 15th minute to the 25 minutes after acetic acid induction.

Table 4. Results of the average number of writhing of mice.

Group test	Mice writhing per minute											
	5	10	15	20	25	30	35	40	45	50	55	60
Control negative	4.2	13.4	16.4	19.0	16.2	13.8	11.0	9.6	7.4	4.6	2.6	1.4
Control positive	2.0	5.2	6.8	8.0	7.2	7.2	5.0	3.2	2.4	2.0	0.6	0.6
Dose I	2.2	8.0	9.2	9.2	8.6	7.4	6.8	4.6	3.6	3.4	2.6	2.0
Dose II	3.2	9.0	7.6	6.8	5.6	5.4	4.6	3.8	3.6	3.2	1.8	1.6
Dose III	1.2	4.2	4.0	3.8	3.0	2.2	1.6	1.6	1.4	0.6	0.4	0.0

Table 5 shows that the larger the DDK value, the smaller the ability to reduce edema volume and if the smaller the DDK value, the greater the ability to reduce edema volume against analgesic drugs [8].

Table 5. Value DDK analgesic.

DDK Group	DDK1	DDK2	DDK3	DDK4	DDK5	Average DDK
Control negative	740.0	475.0	487.5	665.0	602.0	593.9
Control positive	312.5	340.0	282.5	120.0	150.0	241.0
Dose I	370.0	312.5	277.5	362.5	342.5	333.0
Dose II	210.0	182.5	362.0	210.0	392.5	271.4
Dose III	70.0	90.0	65.0	165.0	197.5	117.5

Table 6 shows Mann-Whitney test results, obtained significant differences between each group.

Table 6. Mann-Whitney test results of analgesic group.

Group test	DDK	Control (-)	Control (+)	Dose I	Dose II	Dose III
Control negative	593.9					
Control positive	241.0	0.008*				
Dose I	333.0	0.008*	0.095			
Dose II	271.4	0.008*	0.548	0.421		
Dose III	117.5	0.008*	0.095	0.008*	0.016*	

Notes: * there is a significant difference at the level of <0.05

Figure 1 explains the percentage of effectiveness and the percentage of inhibition the higher the dose of Itchy leaves decoction gives better results, the percentage of anti-inflammatory inhibition, diclofenac sodium is higher than dose groups I, II and III. For analgesic inhibition percentage, diclofenac sodium is higher than dose I and II and lower than dose III.

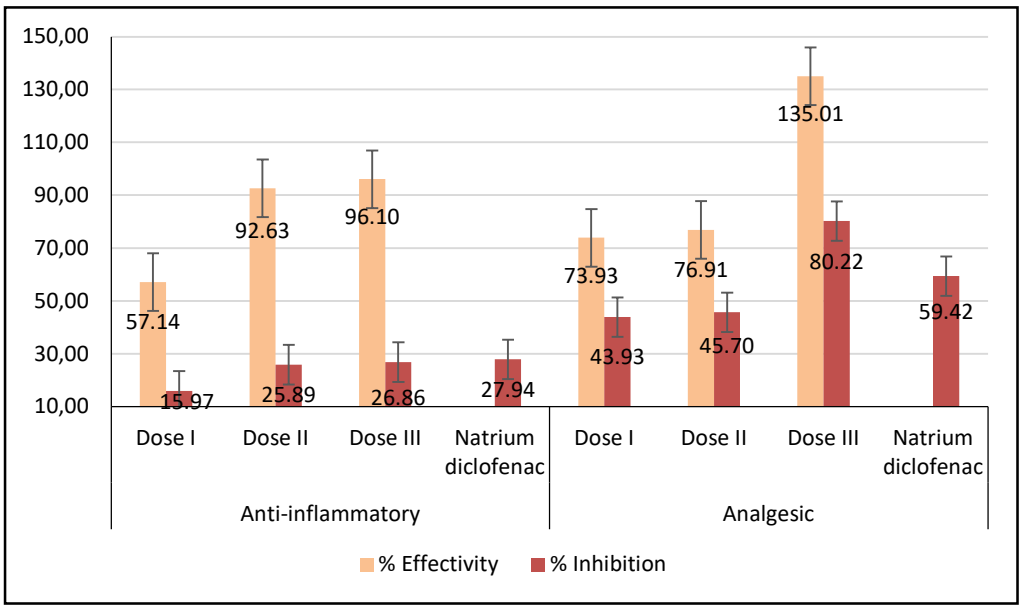

Figure 1. Percentage effectivity and inhibition Itchy leaves decoction

4. DISCUSSION

Based on the chemical content in Itchy leaves, namely alkaloids, triterpenoids, glycosides, and formic acid which are known to have better solubility in polar compounds, hot water is used in the form of a decoction [1]. In this anti-inflammatory test, using Winter's method. The parameter is the decrease in the volume of edema on the soles of the rat's feet in mL, proportional to the time in hours. For analgesic testing, using the Siegmund method with the parameter is the decrease in the number of writhing in mice versus time in minutes. These two methods were chosen because they are methods that are often used and simpler to perform. In the anti-inflammatory test, 25 mice were divided into 5 groups, namely the negative control group using distilled water, positive control using diclofenac sodium 1.8 mg/200 g BW, dose of Itchy leaves decoction I, II, III sequentially 0.3 g/Kg BW, 0.6 g/Kg BW and 1.2 g/Kg BW.

The measurement results showed that there was a decrease in the volume of rat paw udema at the third hour after being induced by carrageenan. In the process of inducing inflammation using carrageenan because it has several advantages including not leaving marks, not causing tissue damage and providing a more sensitive response to anti-inflammatory drugs compared to other irritant compounds [9]. Carrageenan can be used to trigger the formation of suplantarly induced udema on the soles of rat feet [10]. After that, statistical analysis was carried out with the Mann-Whitney test to see any differences in the anti-inflammatory effects of the treatment groups. The statistical results in Table 3 show that the Itchy leaves decoction group doses of 0.3 g/Kg BW, 0.6 g/Kg BW and 1.2 g/Kg BW have anti-inflammatory effects that are significantly different from the negative control group, seen from the p value <0.05, so it can be said that the Itchy leaves decoction group has an anti-inflammatory effect. For the Itchy leaves decoction group doses of 0.6 g /Kg BW and 1.2 g /Kg BW, there was no significant difference with the positive control of diclofenac sodium (p> 0.05).

This indicates that both doses have the same effect as anti-inflammatory drugs to reduce udema volume. For the dose of 0.6 g/Kg BW, there was no significant difference with the dose of 1.2 g/Kg BW. Figure 1 shows the anti-inflammatory inhibition of the positive control group by 27.94%, dose I by 15.97%, dose II by 25.89%, and dose III by 26.86% while the positive control dose of diclofenac sodium 1.8 mg/200 g has a greater ability to inhibit the volume of udema on the soles of carrageenan-induced rat feet by 27.94% compared to the Itchy leaves decoction group, the percentage of anti-inflammatory effectiveness as shown in Figure 1 Itchy leaves decoction dose I, II, and III of 57.14%, 92.63% and 96.10%, meaning that Itchy leaves decoction III has the greatest percentage of effectiveness in reducing the volume of udema of the soles of the feet of rats after induced Carrageenan.

In the analgesic test, 25 mice were divided into 5 groups, namely the negative control group using aquadest, positive control using diclofenac sodium 0.26 mg/20 g BW, dose of Itchy leaves decoction I, II, III sequentially 0.4 g/Kg BW, 0.8 g/Kg BW and 1.6 g/Kg BW. The results of measuring the average number of

writhes showed that there was a decrease in the average number of writhes after glacial acetic acid induction. After that, statistical analysis was carried out with the Mann-Whitney test to see any differences in the anti-inflammatory effects of the treatment groups.

The statistical results in Table 6 show that the Itchy leaves decoction group doses of 0.4 g/Kg BW, 0.8 g/Kg BW and 1.6 g/Kg BW show analgesic effects that are significantly different from the negative control group, judging from the p value <0.05, so it can be said that the Itchy leaves decoction group has an analgesic effect. In the decoction groups I, II, and III there was no significant difference with the positive control of diclofenac sodium, judging from the p value > 0.05. This indicates that the three doses of Itchy leaves decoction have an analgesic effect equivalent to diclofenac sodium. Based on the results of the calculation of DDK, continued with the calculation of the percentage of inhibition of the number of writhing. In the positive control group of 59.42%, decoction I of 43.93%, decoction II of 45.70%, and decoction III of 80.22%. These results show that decoction III has a greater percentage of inhibition of the number of mice writhing when compared to the positive control.

The positive control uses diclofenac sodium, which is a class of non-steroidal anti-inflammatory drugs (NSAIDs) from phenyl acetate derivatives that can inhibit the formation of cyclooxygenase 2 (COX-2) which is an enzyme that triggers the formation of prostaglandins in tissues [11]. Diclofenac sodium was chosen because diclofenac sodium and its metabolites can reach quite high concentrations in the soles of the feet that are experiencing inflammation [12]. The mechanism of action of AINS with COX-1 and COX-2 selectivity can vary and is incomplete for older compounds, but highly effective COX-2 inhibitors can now be obtained [13].

5. CONCLUSION

Itchy leaves decoction at doses of 0.3 g/Kg BW, 0.6 g/Kg BW and 1.2 g/Kg BW has an anti-inflammatory effect, indicated by its ability to inhibit the formation of udema on the soles of mice induced by 1% carrageenan solution, the best effect anti-inflammatory is dose III 1.2 g/Kg BW. Itchy leaves decoction at doses of 0.4 g/Kg BW, 0.8 g/Kg BW and 1.6 g/Kg BW has an effect as an analgesic, indicated by its ability to reduce the number of writhing mice induced by 3% acetic acid. Itchy leaves decoction has a lower anti-inflammatory effect than diclofenac sodium, the best effect anti-inflammatory is dose III 1.6 g/Kg BW. Compounds Itchy leaves contained formic acid, which has anti-inflammatory and analgesic activity.

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REFERENCES

[1] Simaremare E,S. "Phytochemical Screening of Ethanol Extract of Itchy Leaves (*Laportea decumana* (Roxb.) Wedd.)", Cenderawasih University, Jayapura, Indonesia. *Journal PHARMACY,* Vol.11, No. 01, 2014.

[2] Papua Provincial Health Office Centre for the Development and Application of Traditional Medicine (SP3T). "Papuan Traditional Medicinal Plants Based on the Local Wisdom of the Community". 2016

[3] Ariastuti R,Anam K, Pamungkas IY. "Analgesic Effectiveness of Itchy Leaves (Laportea Decumana) on Myalgia patients in ATSJ Village, Asmat District, Papua Province", Sahid Surakarta University. *Jurnal kebidanan*, Vol.10, No. 1, 2018.

[4] Indonesian Ministry of Health. "Indonesian Pharmacopoeia third edition". Jakarta. 1979. Page: 648

[5] Simaremare ES, Holle E, Yabansabra YR, Octavia F, Pratiwi R, Gunawan E. "Toxicity, Antioxidant, Analgesic and Anti-inflamantory of Ethanol Extracts of Laportea aestuans (Linn.) Chew". Cenderawasih University, Jayapura, Indonesia .*Journal of Chemical and Pharmaceutical Research*, Vol. 10, No. 5, 2018. pp.2-16.

[6] Syamsudin, Darmono. "Experimental Pharmacology textbook". Jakarta : Universitas Indonesia. 2011. pp 65-67

[7] Hans GV. Drug discovery and evaluation pharmacology assay. 2nd edition. Springer-Verlag Berlin Heidelberg. 2006

[8] Sutrisna EM, Widyasari DF, Suprapto. "Test the anti-inflammatory effect of ethyl acetate extract of cashew pseudo-fruit (Anacardium occidentale L.) on carrageenan-induced udema of the soles of male white rats". *Biomedika,* vol. 2, no. 1, 2010. pp. 33-37.

[9] Rowe RC, Paul JS, Marin EQ. Handbook of Pharmaceutical Excipients Sixth zedition London: Pharmaceutical Press. 2009.

[10] Anggraini W. "Anti-inflammatory effect of ethanol extract of guava leaves (Psidium guajava Linn) on male white rats of wistar strain (thesis)". Universitas Muhammadiyah Surakarta; 2008.

[11] Tjay TH, Rahardja K, "Essential medicines Efficacy, uses and side effects 6th edition" Jakarta. 2007.

[12] Schweitzer A, Hasler-Nguyen N, Zijlstra J. Prefential uptake of the non steroid anti-inflammatory drug diclofenac into inflamed tissues after a single oral dose in rats. BMC Pharmacology. 2009; 9:5

[13] Khairani, S., Rahayu, L., Sandhiutami, N.M.D., Dewi R.S., Rahmawati, I. "Test-inflammatory and analgesic effect from decoction of bamboo kuning leaves (bambusa vulgaris schard)" Jurnal Kefarmasian Indonesia, vol.19, no.2, 2021. pp 266-271. Available: http://jifi.farmasi.univpancasila.ac.id/index.php/jifi/article/view/875/592