



ACTIVITY ETHANOL EXTRACT OF MANGGA (*Curcuma mangga* Val.) FEET UDEM RAT WHITE

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ABSTRACT

The rhizome of mango *Curcuma* is empirically used as a traditional medicine for the treatment of gastric pain, pain, and inflammation due to hemorrhoids, sore throat, bronchitis, and asthma. The aim of this study was to determine the chemical compound content of secondary metabolites and the activity of the ethanol extract of Temu Mango (*Curcuma mangga* Val.) on the reduction of carrageenan-induced rat paw edema. The results of a preliminary examination of the chemical content of the rhizome of Intersection mango (*Curcuma mango* Val.) showed the presence of glycosides, flavonoids, saponins, essential oils, and steroids. In general, the suspension of the ethanol extract of Temu Mango at doses of 50, 100, 200 mg/kg BW gave an anti-inflammatory effect that began to appear in the first half-hour and continued to increase with increasing time. An increase of 2 times the dose of the ethanol extract of Temu Mango showed an anti-inflammatory effect that was not significantly different, but with an increased dose of 4 times, it showed a significant difference. Even the ethanol extract of Intersection mango at a dose of 200 mg/kg BW gave almost the same effect as indomethacin.

Keywords : Intersection of Mango (*Curcuma mangga* Val.), anti-inflammatory, edema, phytochemical screening

INTRODUCTION

Indonesian society is one of the world's people who know and use traditional medicine in an effort to overcome health problems. Traditional medicine always consists of ingredients derived from plants, animals, minerals, and preparations of extract (galenic) or a mixture of these materials (DitJen POM, 2000). Knowledge of medicinal plants is a national cultural heritage based on experience from generation to generation (Muhlisah, 1999).

Indonesia is a tropical country that is rich in a diversity of plants that are beneficial for health. One of the plants known to have health benefits is the Intersection of Mango (*Curcuma Mangga* Val.). This plant belongs to the Zingiberaceae family and can live in almost the entire Indonesian archipelago.

In Javanese society, fresh mango rhizome is chewed regularly every day as a nutritious vegetable to constrict the vagina. Another benefit of the rhizome of Intersection mango is to increase appetite, strengthen lust, an antidote to toxins, reduce fever due to fever, treatment of gastric pain, pain and inflammation due to hemorrhoids, sore throat, bronchitis, asthma, inflammation caused by wounds, and inhibiting the growth of cancer. In addition, it is used to treat skin diseases in the form of red spots that are very itchy by applying it to the itchy skin (Mukhlisah, 1999).

Based on the explanation above, the authors are interested in determining the chemical group in the rhizome of Intersection mango (*Curcuma mangga* Val.) and testing its anti-inflammatory effect on the feet of white rats induced by 1% (w/v) carrageenan using the

plethysmometer method, as a positive comparison, indomethacin was used.

MATERIALS AND METHODS

The method used in this study was an experimental method in a laboratory with a completely randomized design (CRD). The data were analyzed by ANOVA (analysis of variance) and continued with Duncan's mean difference test using the SPSS 11.0 (Statistical and Product Service Solution) program.

Tools used

The tools used in this research include laboratory glassware, blender (National), rough balance (Ohaus), electric balance (Chyo JP2-600), animal balance (Presica Geniweigher, GW - 1500), microscope (Olympus), water content determination device, percolator, rotary evaporator (Heidolph VV-200), aluminum foil, mortar and stamper, incubator (Gallenkamp), rat cage, rat oral sonde, 1 ml syringe, plethysmometer, filter paper, water baths.

The materials used

The materials used are the rhizome of temu mango (*Curcuma mangga* Val.), 96% ethanol (distilled), aqua demineralize, toluene, carrageenan-lambda, indomethacin (Aceto), carboxymethyl cellulose (CMC), Pb (II) acetate, iron (III) chloride P, mercury (II) chloride, potassium iodide, iodine, α -naphthol, nitric acid, bismuth nitrate, ether, chloroform, isopropanol, methanol, anhydrous sodium sulfate, ethyl acetate, magnesium powder, zinc powder, hydrochloric acid P, ether, anhydrous acetic acid, sulfuric acid P.

Examination of Chemical Class Content

The results of the examination of chemical group content, which include glycosides, flavonoids, steroids/triterpenoid alkaloids, tannins, and saponins.

Preparation of Simplicia

The sample used was the rhizome of Intersection mango (*Curcuma mangga* Val.) taken from the hamlet of Gubuk, Sedayu sub-district, Bantul district, Yogyakarta. The processes carried out in the manufacture of mango meeting Simplicia include wet sorting, washing, chopping, drying, and dry sorting.

Extract Preparation A

A total of 800 g of Simplicia powder was put into a closed vessel and moistened with sufficient solvent, namely 80% ethanol, macerated

for 3 hours. The mass is transferred little by little into the percolator while being carefully pressed each time, then the filtered fluid is poured sufficiently until the liquid begins to drip, and above the simplicia there is still a layer of filter fluid. The percolator was closed and left for 24 hours, then the percolator tap was opened, and the liquid was allowed to drip at a rate of 1 ml per minute. The solvent was added repeatedly so that there was always a layer of the solvent above the simplicia, so that the last percolate was colorless and evaporated, leaving no residue. The perchlorate was distilled under low pressure at a temperature of not more than 50°C to obtain a thick extract and then weighed. The viscous extract obtained was 238 grams. Then it was dried with a freeze dryer at a temperature of -40°C at a pressure of 2 atm \pm 24 hours, and a dry extract was obtained as much as 60 grams.

RESULTS AND DISCUSSION

Determination of the water content of Simplicia obtained a result of 8.21%; this still meets the specified requirements, which is less than 10% (DitJen POM, 1999). Examination of the chemical compound group showed that the simplicia powder contained essential oils, glycosides, flavonoids, steroids, and saponins.

The anti-inflammatory effect was tested using a plethysmometer with the principle of measurement based on Archimedes' law, namely that an object that is inserted into a liquid will exert an upward force or pressure equal to the volume being pushed or moved. This method was chosen because its implementation is simple, it can be clearly observed, and the inflammation that occurs is measured quantitatively.

The inflammation formed is caused by carrageenan injected subcutaneously. Carrageenan is reported to cause inflammatory conditions that can be specifically affected by anti-inflammatory drugs. Carrageenan response to anti-inflammatory drugs is also more sensitive than other irritants (Zuhaini et al., 1990).

Orientation has been carried out on various doses of the ethanol extract of the Intersection of Mango. This indicates that a dose of 50 mg/kg BW has seen an anti-inflammatory effect, while at a dose of 200, it has an anti-inflammatory effect which is almost the same as indomethacin. Therefore, the three doses to be tested were 50, 100, 200 mg/kg BW.

The data obtained from half an hour to the 6th hour were analyzed by ANOVA (analysis of variance), then followed by Duncan's mean difference test using the SPSS program.

This analysis was carried out on the results of the calculation of the total area under the curve (LDDK) of inflammation from each treatment.

ANOVA (analysis of variance) on the total area under the curve (LDDK) of the percentage of inflammation is used to see whether there is a difference in the effect of the test drug, namely the Mango Temu Essai extract for the comparison, namely 0.5% CMC suspension without test material as a negative and indomethacin suspension as a positive comparison.

Based on the results of the ANOVA calculation on LDDK from the percentage of inflammation after negative control (CMC suspension 0.5% without the test material), three doses (50, 100, 200 mg/kg BW) suspension of ethanol extract of Temu Mango and indomethacin suspension for 95% confidence level in table 3

shows that the calculated F (18.532) is greater than F-table (2.76) with a significance value of α -sig 0,005. This shows that all treatments gave a significant difference to the attack on the feet of white rats caused by carrageenan.

To find out which treatment groups have the same or different effects from one another and the group arrangement from the smallest to the largest inflammation is obtained, Duncan's average difference test is carried out. The results of the calculation of Duncan's average difference test can be seen in Table 1 below.

From Table 1, it can be seen that the negative control group had the largest area of inflammation when compared to the suspension group of temu mango ethanol extract (SETM) and indomethacin suspension. The test showed that the two groups gave a significant difference to the negative control group, this means the SETM group and the suspension group indomethacin have a significant anti-inflammatory effect on artificial inflammation in the feet of white rats.

Table 1. Duncan's mean difference test for the effect of Duncan

TREATMENT	N	Significant level (alpha) = 0.05 = 0.05			
		1	2	3	4
SI 10 mg/kg BW	6	25,972			
SETM 200 mg/kg BW	6	56,865	56,865		
SETM 100 mg/kg BW	6		82,049	82,049	
SETM 50 mg/kg BW	6			125,105	
Negative Control	6				226,500
Sig.		0.238	0.334	0.105	1,000

The mean of the same treatment is shown in the table

Information:

SI = Indomethacin suspension; SETM = Suspension of Intersection mango ethanol extract; BB = body weight; Negative Control = 0.5% CMC suspension without test material; Sig. = Significance; N = Number of individuals in the treatment.

Duncan's average difference test on the total area under the curve (LDDK) of percent inflammation, it can be seen that the level of significance = 0.05 For indomethacin suspension as a positive comparison, it has the smallest inflammation but does not show a significant difference with SETM at a dose of 200 mg/kg BW, but there was a significant difference with SETM 50, 100 mg/kg BW and negative control, the lower the inflammation was getting bigger. This means that the ability of indomethacin suspension is almost the same as SETM at a dose of 200 mg/kg

BW in inhibiting inflammation. When the SETM suspension at a dose of 200 mg/kg BW as a comparison showed no significant difference to the indomethacin suspension and SETM at a dose of 100 mg/kg BW but significantly different to SETM at a dose of 50 mg/kg BW and negative control. If SETM was at a dose of 100 mg/kg BW as a comparison, there were no significant differences between SETM doses of 200 and 50 mg/kg BW, but there were significant differences with the indomethacin suspension and negative control. If SETM 50 mg/kg BW as a comparison showed no

significant difference to SETM at a dose of 100 mg/kg BW, but there was a significant difference with indomethacin suspension, SETM at a dose of 200 mg/kg BW, and negative control. When the negative control as a comparison showed significant differences in all treatments, this indicated that the suspension of ethanol extract at doses of 50, 100, 200 mg/kg BW could significantly reduce inflammation caused by 1% w/v carrageenan.

Based on the above explanation, it can be seen that the increase in SETM dose indicates that the amount of inflammation that occurs will be smaller. For a 2-fold increase in the dose given, it did not show a significant difference in inflammation, but for the fourth time, there was a significant difference in inflammation. This may be due to the bioavailability of the ethanol extract of Temu Mango in the body at a dose of 2 times which did not show a significant increase.

From the average percentage of inflammation of the feet of white rats, the

percentage of inflammation inhibition can also be calculated. The results of the calculation of the percentage of inflammation inhibition are in Table 4; it can be seen that all the test drugs and positive comparisons during the first half-hour had an effect. For SETM, doses of 50 and 100 mg/kg BW were seen to have an effect in the first half-hour of 2.07% and 0.21%, respectively, which continued to increase with time. SETM at a dose of 200 mg/kg BW was seen to have an effect in the first half-hour of 47.20% and reached a maximum at the 6th hour by 100% to 4.

In general, from the calculation of the percentage of inflammation inhibition, it is known that increasing the concentration of SETM also has an effect where the higher the dose will increase the anti-inflammatory effect of the SETM. To see the total ability of inflammation inhibition of each test material can be seen from the percentage of total inflammation inhibition. The results of the calculation of the total percentage of inflammation inhibition can be seen in Figure 8 below.

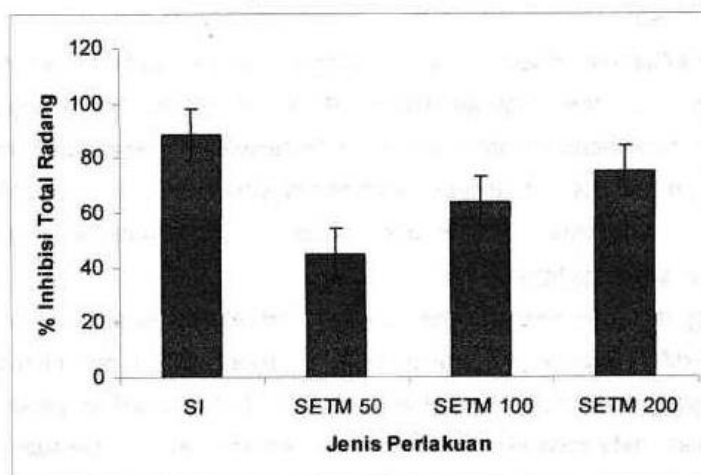


Figure 1 Graph of the percentage of total inflammation inhibition in the administration of indomethacin suspension and ethanol extract of temu mango.

Graph 4 above shows that indomethacin suspension has the highest graph with a PIR of 88.53%, followed by SETM at a dose of 200 mg/kg BW with a PIR of 74.89%, SETM at a dose of 100 mg with a PIR of 63.78% and SETM at a dose of 50 mg/kg BW with a PIR of 44.77%. From this PIR value, it can also be seen that increasing the dose of SETM will increase the ability to inhibit inflammation caused by carrageenan.

The anti-inflammatory effect of the ethanolic extract of Temu Mango, when viewed from the existing literature, may be explained as

follows: The formation of inflammation induced by carrageenan through several sequences of events. The first mediators that appear are histamine and serotonin, followed by the second phase with the release of kinins which maintain increased permeability of the blood vessels, then followed by the third phase, namely the release of prostaglandins which coincides with the migration of the site to the injection site. This will cause a buildup of plasma fluid. Proteins and leukocytes to the injection site cause edema. Besides that, it can cause reactive oxygen products such as

superoxide, which are free radical compounds (Foye, 1996; Rajietal., 2002).

Among the chemical compounds contained in the ethanol extract of Temu Mango, which is considered to have anti-inflammatory effects are flavonoids, curcumin, and saponins.

Flavonoid compounds are one of the antioxidant compounds. Antioxidant compounds are compounds that can protect cells from the damaging effects of reactive oxygen compounds such as singlet oxygen (O), superoxide (O₂⁻), hydroxyl radicals (HO⁻), and peroxyxynitrite (ONOO⁻). In the inflammatory process, reactive oxygen compounds will be formed as a result of the leukocyte membrane oxidation process, and the phagocytosis process in the presence of flavonoid compounds will react with reactive oxygen compounds so as to prevent damage to the phospholipid membrane. Several flavonoid compounds have the potential to inhibit the enzyme cyclooxygenase, lipoxygenase, or both; besides that, they can also reduce membrane fragility and permeability. This can significantly reduce inflammation and help cells to return to their normal state (Buhler and Miranda, 2003; Bruneton, J., 1995).

In general, the genus *Curcuma* is known to contain curcuminoid compounds, one of which is curcumin found in mango meetings (Depkes RI, 1999). As an anti-inflammatory compound, curcuminoids work by inhibiting cyclooxygenase enzymes lipoxygenases, reducing reactive oxygen compounds stimulated by neutrophils, and inhibiting the activation of pro-inflammatory mediators of cytokines TNF (tumor necrosis factor)-alpha and IL (interleukin)-1 beta (<http://www.pdrhealth.com/Curcuminoids.html>).

The anti-inflammatory effects of saponins are thought to have a similar structure to the adrenal corticoid hormone. The aglycone activity of saponins indicates that the ability to inhibit prostaglandin E₂ synthesis is small (Ammar et al., 1997). However, the same magnitude as other compounds in one crud extractability to suppress inflammation will be more significant.

Conclusion

The results of a preliminary examination of the chemical content of the rhizome of Intersection mango (*Curcuma mangga* Val.) indicated the presence of glycosides, flavonoids, saponins, essential oils, and steroids.

In general, the suspension of the ethanol extract of

Temu Mango at doses of 50, 100, 200 mg/kg BW gave an anti-inflammatory effect that began to appear in the first half-hour and continued to increase with increasing time. An increase of 2 times the dose of the ethanol extract of Temu Mango showed an anti-inflammatory effect that was not significantly different, but with an increased dose of 4 times, it showed a significant difference. Even the ethanol extract of Intersection mango at a dose of 200 mg/kg BW gave almost the same effect as indomethacin.

REFERENCES

- Ammar NM, Al Okbi SY, and Mohamed DA, (1997). Study of The Anti-inflammatory Activity of Some Medical Edible Plants Growing in Egypt. *Journal of Islamic Academy of Sciences*. 10(4). <http://www.medicaljournal-ias.orb/JIASVolume10-4.htm>
- Bruneton, J. (1995). *Pharmacognosy Phytochemistry Medicinal Plant*. Paris: Lavoisier Publishing. pp. 257, 280, 553.
- Buhler Donald R.. and Miranda Cristobal. (2003). "Antioxidant Activities of Flavonoids." On line. 2003. <http://lpi.oregonstate.edu/AntioxidanActivitiesofFlavonoids.html>
- Health RI. (1999). White Turmeric: *Curcuma zedoaria* & *Curcuma mango*. Depkes.RI.SP. NC 383/12.0/1999 <http://www.KunirPutih.tripod.com/photoalbum.html>
- DitJen POM. (1974). *Indonesian Pharmacopeia Extra*. Volume I. Jakarta: Ministry of Health of the Republic of Indonesia. Case. 831.
- Directorate General of POM. (1985). *How to make it simple*. Jakarta: Ministry of Health of the Republic of Indonesia. Case. 1-23.
- Directorate General of POM. (1986). *Galenic Preparation*. Jakarta: Ministry of Health of the Republic of Indonesia. Case. 1-61.
- Directorate General of POM. (1989). *Indonesian Medical Materials*. Volume VI. Jakarta: Ministry of Health of the Republic of Indonesia. Case. 322-339.
- Directorate General of POM. (1991). *Pharmacological Screening, Phytochemical Testing and Clinical Testing*. Jakarta: Center for Development and Utilization of Natural Medicines. pp. 43-45.

- Directorate General of POM. (1995). *Indonesian Pharmacopeia*. Edition IV. Jakarta: Ministry of Health of the Republic of Indonesia. Case. 461.
- Directorate General of POM. (1999). *Good Simplicia Processing Method*. Jakarta: Ministry of Health of the Republic of Indonesia. Pages 1-11.
- Directorate General of POM. (2000). *Guidelines for the Implementation of Traditional Medicine Clinical Trials*. Edition I. Jakarta: Ministry of Health of the Republic of Indonesia. Case. 1.
- Farnsworth, NR (1996). Biological and Phytochemical Screening of Plants. *Journal of Pharmaceutical Sciences*. 55(3): 245-265.
- Foye, OW (1996). *Principles of Medicinal Chemistry* Volume 2. Edition 2. Yogyakarta: UGM Press. Case. 1094-1127.
- (1996). Analgesic-Antipyretic and Anti-inflammatory Agents and Drugs Employed in The Treatment of Gout. In: Hardman GJ, Limbird EL, and Gilman GA, editors. Goodman and Gilman's The Pharmacological Basis of Therapeutics. 9th ed. New York: McGraw-Hill: p.621.
- FW, Mariana, Y., and Rusnawan, I. (1990). Anti-Inflammatory Effects of Ginger (*Zingiber officinale*. Rosc.) Against Artificial Inflammation in White Rats. *Indonesian Pharmacology and Therapy Magazine*. 7(1): 9-13.
- LK., and Evelyn, RE (1996). *Pharmacology: Nursing Process Approach*. First print. Jakarta: EGC Medical Book Publisher. Case. 310-315.
- S. (1999). Mechanism of Action of Anti-inflammatory Drugs. *Pharmaceutical Media: An Indonesian Pharmaceutical Journal*, 7(1). 34-40.
- F., (1999). *Findings and Compounds of Cultivation and Their Benefits*. Yogyakarta: Canisius Publishers. Case. 73-76.
- E., (1999). *Drug Dynamics: Textbook of Pharmacology and Toxicology*. Translators: Widiyanto BM and Ranti SA Edition 5. Third printing. Bandung: ITB Publisher. Case. 194-208.
- Napitupulu, M. (2004). Determination of Simplicity Requirements and Examination of Essential Oils from the rhizome of Temu Mango (*Curcuma mango* Val.). Essay. Department of Pharmacy USU Medan. Case. 34-89.
- Nugroho, EA, Gunawan. D. and Lydia, Lubis. MRA, (2003). Ethanol Extract and *Morinda citrifolia* Wistar Male Rats. *Pharmaceutical Media: An Indonesian Pharmaceutical Journal*. 11(2): 95-101.
- , SA and Wilson, LM (1995). *Pathophysiology: Clinical Concepts of Disease Processes*. Issue 4. First printing. Jakarta: EGC Medical Book Publisher. Case. 35-50.
- Raji, Y., Udoh US, Oluwadara OO, Akinsomi Soye OS, Aobajo O., and Adeshoga K. (2002). Anti Inflammatory and Analgesic Properties of The Rhizome Extract of *Zingiber officinale*. *af. J. Biomed. res*. 5: 121-124.
- (2001). Phytochemical Screening and Anti-Inflammatory Effect Test of Ginger Rhizome Extract on Wistar Strain Rats. *Pharmaceutical Media: An Indonesian Pharmaceutical Journal*. 9(2): 105.
- br Windows (2001). ANOVA One Way [computer program]. Version 11.0: Computerized Systems.
- Cheppy. (2003). Temu Putih: Anti-Cancer Medicinal Plants. First print. Jakarta: Self-Help Spreader. Case. 1-6, 16-17, 42-56.
- Teguh, W. (2004). Easy Ways to Perform Statistical Analysis With SPSS (Case Studies, Discussions and Best Techniques for Reading Output). Edition 1. Yogyakarta: Media Style Publisher. Case. 69-75.