

# THE ANALGESIC EFFECT OF *Curcuma xanthorrhiza* Roxb AND *Curcuma domestica* VAL: ANALYSIS OF THE ETHANOL EXTRACT IN MICE WITH WRITHING TEST

Lilik Yusetyani<sup>1</sup>, Herra Studiawan<sup>2</sup>, Reni Sulistyawati<sup>1</sup>

Department of Pharmacy, Faculty of Health Science, University of Muhammadiyah Malang, Indonesia.

## Abstract

**Background.** Wild Ginger (*Curcuma xanthorrhiza* Roxb) and turmeric (*Curcuma domestica* Val) are traditional herbals which can be used as analgesics.

**Methods.** The method used was experimental method with Post Test Control Group Design. Male mice aged 2-3 months with weight of  $\pm 20$  grams were divided into 8 groups, each consists of 5 mice. All mice adapted for 1 week in advance. Positive control group was given 2.68 mg/20g body weight acetosal, group II was treated with a solution of ethanol extract of ginger dose 0.84 mg/20g body weight, group III was treated with a solution of ethanol extract of ginger dose 1.68 mg/20g body weight, group IV was treated with a solution of ethanol extract of ginger dose 2.52 mg/20g body weight, group V was treated with a solution of ethanol extract of turmeric dose 0.91 mg/20g body weight, group VI were treated with a solution of ethanol extract of turmeric dose of 1.82 mg / 20g body weight, group VII were treated with a solution of ethanol extract of turmeric 2.73 mg/20g dose of body weight, Group VIII as negative control was given 0.5 ml/20g body weight CMC-Na. After 30 minutes the eight groups were injected with 0.2 ml 0.6% acetic acid intraperitoneal and then allowed to stand for 10 minutes, henceforward, the stretchings of the mice were observed and calculated. The data was analyzed with the Annova test.

**Results.** The result analyzed statistically with ANOVA test and LSD test menu showed that there was no significant difference between group K (+) in group TL1, TL2, TL3, KY1, KY2, KY3; groups TL1 to KY1; group TL2 to KY2 ; group TL3 to KY3. While the results showed there were significant differences between group K (+) with a group K (-); group K (-) with group TL1, TL2, TL3, KY1, KY2, KY3.

**Conclusion.** Delivery of ethanol extract of *Curcuma* (*Curcuma xanthorrhiza* Roxb) and the turmeric (*Curcuma domestica* Val) can affect the amount of stretchings that induced by acetic acid 0.6%

**Keywords:** Extract, *Curcuma xanthorrhiza* Roxb and *Curcuma domestica* Val, Writhing, Acetosal.

---

<sup>2</sup>Faculty of Pharmacy, Airlangga University, Indonesia

## INTRODUCTION

Pain response is the body's defense mechanism through the detection, localization and identification of the tissue damage that can be addressed immediately (Guyton and Page, 2000). Based on recent studies of the prevalence of rheumatic pain, especially pain in Indonesia, reached 23.6% to 31.3%. This prevalence shows that the pain is quite disturbing activities of people in Indonesia ( Zeng, *et al* 2008).

The ideal treatment for pain is to eliminate the cause, and treat of diseases that cause pain. Analgesic medication is the forefront of treatment for cases of pain, so pain should be treated with medication non-steroidal anti-inflammatory analgesics (NSAIDs) that work by inhibiting the enzyme cyclooxygenase (Field and Martin, 2001). However, treatment with NSAIDs is not always successful, it can even cause side effects such as gastrointestinal disorders, impaired platelet function, and hypersensitivity (Wilmana, 1995). Due to side effects that can be caused by the use of NSAIDs, the use of plants as analgesics can be considered, and not all people are able to reach the cost of medical treatment. Traditional medicine and medicinal plants used by the medium public , especially in an effort to preventative, promotive and rehabilitative. While most people assume that the use of traditional medicinal herbs, relatively safer than synthetic drugs (Andri, 2010).

Indonesia is rich in natural resources that can be used as traditional medicine. One of the plants that can be used in traditional medicine is *Curcuma xanthorrhiza Roxb*) and *Curcuma domestica Va*. From the results of research in medicine, it is known that *Curcuma xanthorrhiza Roxb* and *Curcuma domestica Val* contains class of compounds curcuminoid and essential oil (Fingerprint, 2006). ). Curcuminoid in *Curcuma xanthorrhiza Roxb* consists of two types of compounds, namely curcumin and dosmetox, curcumin, while curcuminoid in *Curcuma domestica Val* is composed of three types of compounds, namely curcumin,

dosmetox, curcumin,, and dosmetox, curcumin, Content of curcuminoid compounds may be efficacious to neutralize toxins, relieve joint pain, increases bile secretion, lowering blood cholesterol and triglycerides, antibacterial, and can prevent the occurrence of lipogenesis in liver cells and as an antioxidant for substances that are harmful radicals. In addition *Curcuma xanthorrhiza Roxb* containing the curcuminoid compounds, and *Curcuma domestica Val* also contains essential oils. The content of essential oils in *Curcuma xanthorrhiza Roxb* and *Curcuma domestica Val* have effects increases of renal work and helps the metabolism and physiology of the organs of the body to speed healing. Essential oils also have an analgesic effect of relieving the pain caused by inflammation of the liver. In addition, also as a laxative obstructed menstruation. The analgetic properties can relieve pain during menstruation and the pain caused by inflammation (Rukmana, 1994).

Previous research that supports that *Curcuma xanthorrhiza Roxb* and *Curcuma domestica Val* has analgesic effect, is in the presence of analgesic effect of extract *Curcuma xanthorrhiza Roxb* in the rat (*Rattus norvegicus*) STRAIN Wistar (Yunia Widyasari Sutrisna, 2008). In addition so analgesic effects infusum of *Curcuma domestica Val* in female mice (Rumhanik, 1995).

The use of turmeric *Curcuma xanthorrhiza Roxb* and *Curcuma domestica Val* in this study, in the form of extracts by maceration method as related to chemical properties of the two compounds, namely curcumin is insoluble in water, but soluble in ethanol and volatile oil that is easy evaporates at a temperature that is too high. Plant extracts obtained by maceration has its advantages, namely the content of the material obtained is assured of its purity, the process is relatively efficient , and without heating (Tjay and Rahardja, 2002).

For it will be investigated the influence of ethanol extract of *Curcuma xanthorrhiza Roxb* and extract *Curcuma domestica Val*,to the

analgesic effect in male mice with a chemical stimulus (writhing test).

## METHODS

This study is an experimental study using the Post Test Control Group Design, because the analgesic effect was measured after administration of extract of *Curcuma xanthorrhiza Roxb* and extract of *Curcuma domestica Val*, with the aim of proving the presence or absence of affective analgesic in both extract in mice (*mus musculus*) with writhing test method. The research was carried out for 1 month with the study population was of mice (*mus musculus*), male gender, old 2-3 months, body weight  $\pm 20$  g in healthy condition is characterized by active movement and the fur is not dull. Parameters measured on the measurement of pain response in mice using the method Writhing test, it is a test analgesic use chemical stimuli, namely the injection of acetic acid in intra peritoneal. Pain response is characterized by the stretching of the abdominal muscle contraction, the extraction of all four limbs, and the calculated elongation of the body within 30 minutes. Analgesic effects are characterized by a decrease in the number of stretching that cause pain responses after the mice given the extract of *Curcuma xanthorrhiza Roxb* and *Curcuma domestica Val*. Groups of mice that given the extract of *Curcuma xanthorrhiza Roxb* and *Curcuma domestica Val* capable to decrease of stretching than the group of mice not given of both extract.

## RESULT.

To show the evidence of the compound of terpenoid in the *curcuma xan thorhiza Roxb* and *Curcuma domestica Val* then performed a Thin Layer Chromatography( TLC) .

Results Identification of Compounds Content of *Curcumax anthorhiza Roxb* and *Curcuma domestica Val*.

The results of Thin Layer Chromatography (TLC) on *Curcuma xan thorhiza Roxb*

Mobile phase : n-hexane: ethyl acetate (4:1)

Stationary phase : Kiesel Gel 254

Appearance of stains : Anisaldehyda sulfuricacid

Results : purple-red stain

Conclusion : Positive indicate a terpenoid

- The average of Rf value

$$Rf_1 = \frac{5,5}{8} = 0,6875$$

$$Rf_2 = \frac{4,7}{8} = 0,5875$$

$$Rf_3 = \frac{4,4}{8} = 0,55$$

$$Rf_4 = \frac{3,5}{8} = 0,4375$$

$$Rf_5 = \frac{2,7}{8} = 0,3375$$

everage of Rf = 0,52

- Test results of Thin Layer Chromatography (TLC) on *Curcuma xanthorrhiza Roxb*

Mobile phase : n-hexane:ethyl acetate (4:1)

Stationary phase : Kiesel Gel 254

Appearancestains : Anisaldehyda sulfuric acid

Results : purple-red stain

Conclusion : Positive indicate a terpenoid

Rf value :

$$Rf_1 = \frac{6,4}{8} = 0,8$$

$$Rf_2 = \frac{5,5}{8} = 0,6875$$

$$Rf_3 = \frac{5,0}{8} = 0,625$$

$$Rf_4 = \frac{4,5}{8} = 0,5625$$

$$Rf_5 = \frac{3,5}{8} = 0,4375$$

Average of Rf = 0,62

Based on the results of research on test analgesic effect of extract *Curcuma*

*xanthorrhiza Roxb* and *Curcuma domestica Val* in mice by writhing test method that has been done in the Chemical Laboratory Muhammadiyah Malang, the obtained data of the study, then conducted data analysis and discussion can made clear as the description below:

**Table I. The number of stretching pain response in each treatment for 30 minutes**

| Mice           | Number of stretching in each Group for 30 minutes |             |             |             |             |             |             |             |
|----------------|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                | Control (+)                                       | TL1         | TL2         | TL3         | KY1         | KY2         | KY3         | Control (+) |
| Red head       | 15  | 36          | 40          | 21          | 48          | 12          | 23          | 80          |
| Black head     | 20  | 15          | 25          | 24          | 39          | 29          | 10          | 71          |
| Blue head      | 9   | 31          | 19          | 17          | 18          | 30          | 21          | 46          |
| Red tail       | 14  | 50          | 33          | 15          | 36          | 29          | 29          | 31          |
| Black tail     | 19  | 44          | 17          | 22          | 27          | 31          | 11          | 60          |
| Total          | 77  | 176         | 134         | 99          | 168         | 131         | 94          | 288         |
| <b>Average</b> | <b>15,4</b>                                       | <b>35,2</b> | <b>26,8</b> | <b>19,8</b> | <b>33,6</b> | <b>26,2</b> | <b>18,8</b> | <b>57,6</b> |

Description:

Control(+)=PositiveControlTreatment(GivingAcetosalm/20g0.5BB)

Control(-)= NegativeControltreatment (CMC-Na0.5Provisionml/20gBB)

TL1=Givingdoses of extract *Curcuma xanthorrhiza Roxb*0.84mg/20gBW)

TL2=Giving doses of extract *Curcuma xanthorrhiza Roxb* 1.68 mg/20gBW)

TL3=Giving doses of extract *Curcuma xanthorrhiza Roxb* 2.52mg/20gBW)

KY1=Giving doses of extract *Curcuma domestica Val* 0.91mg/20gBW)

KY2=Givingdoses ofextract *Curcuma domestica Val* 1.82mg/20gBW)

KY3=Givingdoses ofextract *Curcuma domestica Val* 2.73mg/20gBW)



*Curcuma xanthorrhiza Roxb*

*Curcuma domestica Val.*

Figure 1 Test results of Thin Layer Chromatography (TLC) of ethanol extract *Curcuma xanthorrhiza Roxb* dan *Curcuma domestica Val.*

### Data Analysis Results.

One-way analysis ANOVA Test (ANOVA One Way)

Based on the results of the obtained data is then processed and analyzed to determine a decrease in the amount of stretching that causes the pain response of various doses of *Curcuma xanthorrhiza Roxb* and *Curcuma domestica Val* to indicate the presence or absence to control analgesic effect by using Oneway ANOVA test. ANOVA test aims to see the significance or the difference in the average number of stretching between each treatment group.

**Table II. Oneway ANOVA Summary of Ethanol Extracts Analgesic Effects *Curcuma xanthorrhiza* Roxb and *Curcuma domestica* Val by Whriting Test Methods of Treatment In Eight group of treatment**

| ANOVA          |                |    |             |       |      |
|----------------|----------------|----|-------------|-------|------|
| stretching     |                |    |             |       |      |
|                | Sum of Squares | df | Mean Square | F     | Sig. |
| Between Groups | 6318.175       | 7  | 902.596     | 7.590 | .000 |
| Within Groups  | 3805.600       | 32 | 118.925     |       |      |
| Total          | 10123.775      | 39 |             |       |      |

ANOVA test results obtained on the  $p = 0.000$  ( $p < 0.05$ ). This shows there is significant influence of ethanol extract of *Curcuma xanthorrhiza* Roxb and *Curcuma domestica* Val to decrease the number of stretching.

LSD test. LSD test aims to see the significance or the difference between treatment groups. LSD test results can be seen in the summary table below.

*domestica* Val to decrease the number of stretching.

The results of calculation of percent protection can be obtained from the following formula:

$$\% \text{ Protection} = 100 - (P / K \times 100\%), \text{By:}$$

P = the amount of stretching treatment groups

K = number of negative control group stretching (Turner, 1985).

**Table III. Summary of LSD Test Analgesic Effect of *Curcuma xanthorrhiza* Roxb and *Curcuma domestica* Val by Whriting Test Methods Between Treatment Group**

| P    | TL1      | TL2      | TL3      | KY1      | KY2      | KY3      | K(-)     |
|------|----------|----------|----------|----------|----------|----------|----------|
| K(+) | P=0,11   | P=0,716  | P= 0,998 | P= 0,179 | P= 0,766 | P= 1,000 | P= 0,000 |
| TL1  |          |          |          | P= 1,000 |          |          |          |
| TL2  |          |          |          |          | P= 1,000 |          |          |
| TL3  |          |          |          |          |          | P= 1,000 |          |
| KY1  |          |          |          |          |          |          |          |
| KY2  |          |          |          |          |          |          |          |
| KY3  |          |          |          |          |          |          |          |
| K(-) | P= 0,003 | P= 0,000 | P= 0,000 | P= 0,001 | P= 0,000 | P= 0,000 |          |

Percent of Protection Analysis. Percent protection analysis was done in order to see the ability of analgesic effect of ethanol extract of *Curcuma xanthorrhiza* Roxb and *Curcuma*

From the results of this study on Analgesic Effect of test Ethanol extract *Curcuma xanthorrhiza* Roxb and *Curcuma domestica* Val by Whriting Test method, the obtained results of



Figure.2 Persen (%) Diagram Proteksi geliatan tiap perlakuan yang menimbulkan respon nyeri pada mencit (*mus musculus*) selama pengamatan 30 menit dengan metode writhing test

percent protection can be seen in diagram form below:

From the figure. 2 shows that the percent protection test analgesic effect of ethanol extract of *Curcuma xanthorrhiza Roxb* and *Curcuma domestica Val*, the percentage of protection in which the *Curcuma xanthorrhiza Roxb* and *Curcuma domestica Val* with 3 dose levels, in which extract of *Curcuma xanthorrhiza Roxb*, namely at 0.84 mg / 20 g BW; 1.68 mg / 20 g BW, and 2.52 mg / 20 g BW and so on extract of *Curcuma domestica Val* with three dose levels of 0,91 mg / 20 g BW; 1.82 mg / 20 g BW, and 2.73 mg / 20 g BW, yield percent protection in which each treatment extract produced amount of per cent protection lower than the amount percent positive control protection. This showed that the analgesic effect on the ability of ethanol extract of *Curcuma xanthorrhiza Roxb* and *Curcuma domestica Val* of stretching, the

amount indicating pain response and analgesic effectiveness of the ethanol extract of *Curcuma xanthorrhiza Roxb* and *Curcuma domestica Val* under the aspirin.

## CONCLUSION

Based on the results and discussion in this study can be concluded extract of *Curcuma xanthorrhiza Roxb*, namely at 0.84 mg / 20 g BW; 1.68 mg / 20 g BW, and 2.52 mg / 20 g BW and so on extract of *Curcuma domestica Val* with three dose levels of 0,91 mg / 20 g BW; 1.82 mg / 20 g BW, and 2.73 mg / 20 g BW, have analgesic effects on whitemice (*Mus musculus*) by the method of writing test and can reduce amount if stretching that induced by acetic acid 0.6%..

## REFERENCES

- Andri, Andreas; Bajamal, Abdul.2000. Penatalaksanaan Neuralgia Masa Kini. <http://www.tempo.co.id>. Diakses 15 November 2010.
- Field dan Martin. 1995. Nyeri: Patofisiologi dan Penatalaksanaan. Dalam Prinsip-prinsip Ilmu Penyakit Dalam. EGC. Jakarta.
- Rukmana, 1994. Kunyit. Kanisius. Jakarta.
- Tjay TH; Rahardja K. 2002. Obat-obat Penting. PT Elex Media Komputindo. Jakarta.
- Wilmana, PF. 1995. Analgesik-Antipiretik: Analgesik Antiinflamasi Nonsteroid dan Obat Pira. Farmakologi dan Terapi Edisi 4. FKUI. Jakarta.
- Zeng, *et al*, 2008