



Analgetic Effects of Kangkung (*Ipomea reptans* Poir) Extract on Swiss Webster Mice

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Abstract

One of the efficacious plants as an empirical analgesic is kangkung (*Ipomea reptans* Poir). The purpose of this study was to determine the analgesic effect of kangkung and determine the dose of kangkung extract compared to ibuprofen. The benefit of this research is to know the analgesic effect of kangkung extract. The contents of kangkung extract are flavonoids. The research method of this experimental test is divided into 5 groups, each group consisting of 5 mice with weight 20-30 grams and age 2-3 months. Group I Negative control (Aquadest), group II Positive control (the suspension of ibuprofen), group III, IV, and V respectively were given the ground kangkung extract dose 6 mg/30 g, 12 mg/30 g, 24 mg/30 g. The treatment is administered orally, and for the introduction of the induction using acetic acid 0.5% dose 0.2 ml/20 g mice are intraperitoneal. The result of analyzed by Test homogeneity followed by a Variant analyze Test (ANOVA) one way with SPSS for window version 16. The homogenized results of the research of kangkung extract and ibuprofen (P = 0.24), a one-way test is obtained significant result 0.00, the dose I, II, III differs significantly with negative and positive control. Conclusion of the ground Kangkung extract has an analgesic effect by lowering the amount of stretched. The results showed at a dose of 28 mg/30 g mice caused the best analgesic effect among the variations of the dose tested.

Keywords: Mathematics, instructions for authors, manuscript template.

1. Introduction

Pain is an unpleasant sensory and emotional experience resulting from actual or potential tissue damage, or described in terms of such damage. Analgesics are compounds in therapeutic doses which can relieve or suppress pain, without losing consciousness (Pillai A., 2017). One of the analgesics is Non-Steroid Anti-Inflammatory Drugs (NSAIDs), which are the most widely used non-narcotic analgesics, one example is ibuprofen by inhibiting prostaglandins in certain areas.

2. Literature Review

Pain is the most common reason why patients come to seek medical help (IASP taxonomy, 2012). The feeling of pain can greatly interfere with a person's quality of life, but actually pain is a warning that there is tissue damage so that it can provide a warning to avoid life-threatening dangers (Satyanegara, 2014).

Epidemiological studies in the UK show that the prevalence of pain is more common in women and increases in old age. Pain was also found to increase in groups of low socioeconomic status, especially headaches (King S, Chamber Ct et al, 2011). The pain study group of the Association of Indonesian Neurologists (Pokdi Pain Perdossi) in May 2002 in 14 teaching hospitals throughout Indonesia reported that the number of male patients was 2200 and 2256 female. Most cases are headache followed by low back pain, neuropathic pain, and other pains such as shoulder, joint, myofascial pain, and so on (Resende, et al., 2010).

Pain based on the mechanism is divided into nociceptive pain, neuropathic pain, and mixed pain. Nociceptive pain is pain that arises due to actual or potential damage to non-neural tissue (somatic or visceral) and is caused by activation of nociceptors. Nociceptive pain can be found clinically in osteoarthritis, rheumatoid arthritis, gouty arthritis, arthralgia, low back pain, and myalgia (O'Brien Jr, et al, 2007).

Treatment using medicinal plants has existed and is known by the people of Indonesia since ancient times. Many medicinal plants have been reported to have therapeutic effects for several diseases, but knowledge about the efficacy

and safety of these natural medicines has not been scientifically tested, one of which is Kangkung (*Ipomea reptans* Poir) (Sumbawati et al., 2018). From the cases that occur and are reported, to overcome pain, it is not only necessary to use chemical drugs, it is necessary to carry out research to develop medicinal plants in Indonesia. Where empirical medicinal plants in Indonesia are very numerous and not all have been developed and researched, one of which is kangkung.

Kangkung is a leaf vegetable belonging to the Convolvulaceae family. Generally, these varieties have similar morphological characteristics, namely upright, uniform plant growth, green leaf and stem color, oval or sharp leaf shape, plant height reaching 20-30 cm. The content of kangkung (*Ipomea reptans* Poir) are flavonoids, polyphenols, vitamin E and has a very high antioxidant activity compared to *Centella asiatica* and *Nyctanthes arborescens* (Biswas, et al, 2022).

Besides having antioxidant activity, kangkung also has effectiveness as an analgesic drug because it contains flavonoid compounds. Flavonoids act as analgesics whose mechanism action is to inhibit the action of the cyclooxygenase enzyme. Thus it will reduce the production of prostaglandins by arachidonic acid thereby reducing pain (Hariono, et al, 2021). Treatment using medicinal plants has existed and is known by the people of Indonesia since ancient times. Many medicinal plants have been reported to have therapeutic effects for several diseases, but knowledge about the efficacy and safety of these natural medicines has not been scientifically tested, one of which is kangkung (*Ipomea reptans* Poir).

To find out the effectiveness of kangkung (*Ipomea reptans* Poir) in causing an analgesic effect, Ibuprofen syrup was used as a comparison effect because it is easy to obtain, economical price and also widely used as the main choice for reducing pain. Since there is no information on tests using kangkung extract (*Ipomea reptans* Poir) as an analgesic effect, the authors intend to conduct a study to test the analgesic effect using kangkung extract.

The formulation of the problem and the research objectives that will be sought in this research are to find out:

- a. Does the extract of kangkung (*Ipomea reptans* Poir) provide an analgesic effect on mice?
- b. What is the optimal dose of kangkung extract (*Ipomea reptans* Poir) that can provide an analgesic effect on mice?

3. Materials

Materials including: Oral sonde, Syringe 1 ml, Triple Beam Balance Scales, Analytical scales, Mice cage, Stopwatch, Cotton, Mortar, Stamper, Beaker glass, Stirring rod, Marker. The ingredients used in the study were: kangkung extract (*Ipomea reptans* Poir), Na CMC, 0.5% acetic acid, Ibuprofen syrup 100 mg / 5 ml, Aquadest. Object of Study: The experimental animal used was a swiss webster strain mice with a lifespan of 2-3 months and a body weight of between 20-30 grams. The test animals here used 25 swiss webster strain male mice.

4. Methods

The research conducted is an experimental study with the design of Post Test Only Controlled Group Design, which is a type of research that only observes the control group and treatment after being given action. The study was conducted to determine the activity of writhing using kangkung extract (*Ipomea reptans* Poir).

4.1. Manufacture of Simplicia Kangkung

The first stage of this research is to prepare simplicia from kangkung leaves as the active ingredient of this research. Fresh kangkung leaves are collected and sorted from damaged and unfit leaves. After sorting, they are cleaned using running water to separate the adhering impurities, then dried using an oven at 45°C. After drying, the simplicia of kangkung leaves is ground to reduce its size using a disk mill machine with a 40 mesh size sieve.

4.2. Extract Kangkung Method

The simplicia kangkung that is already dry will be extracted. The extraction method used in this study was a cold extraction method, namely maceration, using 70% ethanol as much as 7 liters for a simplicia weight of kangkung as much as 669.8 gr. Simplicia is put into the extractor container with added 70% ethanol solvent. Maceration process is carried out for 24 hours. The filtrate from the maceration results was filtered and evaporated using a rotary evaporator at 45°C, and a thick extract of 124.6 gr was obtained.

4.3. Routes Administration of Preparations Test Animals

The stage of administration of ibuprofen suspension and kangkung extract suspension orally. Position the mice as if they were going to be given the preparation, where the sonde used was an oral sonde. Ibuprofen preparations and kangkung extract that have been prepared and calculated according to the dose used for each mice are put into the oral sonde syringe. Insert the oral probe into the mice by penetrating the roof of the mice's mouth until it touches the esophagus. taking care not to get the preparation into the throat of mice (Al Shoyaib et al., 2020; Turner et al., 2011).

Stage of administration of acetic acid as an intraperitoneal pain induction in mice. Acetic acid 0.5% solution that has been prepared in a beaker glass is put into a syringe to be given to each mouse. Each group was given treatment orally with a dose level determined by each treatment consisting of 5 different groups, namely:

- 1) Group 1: Negative control (Aquadest)
- 2) Group 2: Positive control (Ibuprofen syrup 100 mg/5 ml)
- 3) Group 3: Dose 1 (200mg/Kg BW)
- 4) Group 4: Dose 2 (400mg/Kg BW)
- 5) Group 5: Dose 3 (800mg/Kg BW).

4.4. Analgesic Activity Testing Procedure

After the mice were given treatment according to the group, 30 minutes later the mice were given pain induction, with 0.5% acetic acid intraperitoneally. The mice's movements were observed for 1 hour. In this analgesic activity test using the chemical method of pain induction or often also called the writhing test method.

The writhing test is demonstrated by contraction of the abdominal wall, legs pulled back so that the abdomen touches the bottom of the space it occupies.

This method was chosen, because it is easy to do without special expertise, which is usually also used for non-narcotic analgesic testing. The principle of this method is to observe a decrease in the amount of writhing that occurs due to intraperitoneal administration of a test substance in the form of 0.5% acetic acid.

The concentration of acetic acid used is in the form of acetic acid with a concentration of 0.5% which can give mice writhing. The injection is done intraperitoneally because absorption occurs fast and constant, and the resulting effect can last a long time. Based on the predetermined dose, the mice's writhing that occurred was observed for 1 hour and counted.

Based on the dose that has been determined by observing each writhing of mice that occurs for 1 hour, then the percentage of analgesic power is calculated using the analgesic power calculation, namely:

$$\% \text{ Daya Analgetik} = 100\% - \left(\frac{p}{k} \times 100\% \right) \quad (1)$$

Description:

P: The cumulative number of mice in the treatment group

K: The cumulative number of writhing mice in the negative control group.

5. Result and Discussion

The research data was obtained from 5 groups of mice, each group consisting of 5 mice.

Table 1: The number of mice wriggling for 1 hour

Treatment	Cumulative number of mice every 5 minutes for					
Group	1 hour					
	1	2	3	4	5	Total
Control (-)	40	27	17	40	16	140
Control (+)	1	2	0	1	5	9
Dose 1	17	11	11	5	16	60
Dose 2	14	12	0	16	2	44
Dose 3	0	22	0	0	2	24

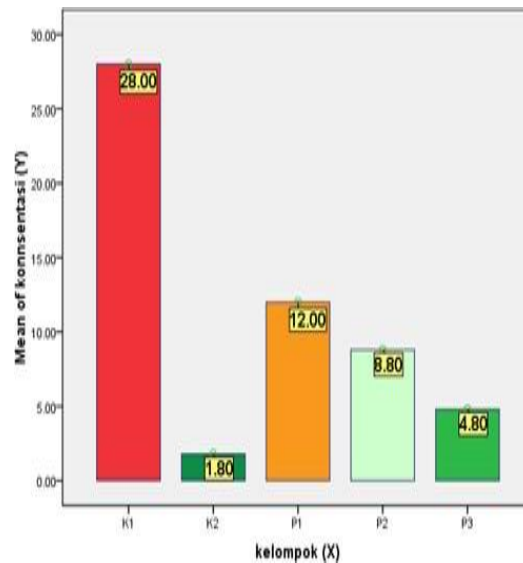


Figure 1: Graph of the cumulative number of mice

Table 2: Homogeneity test and ANOVA

Test	Significance
Homogeneity	0.24
ANOVA	0.00

This study was conducted to determine the analgesic activity of kangkung extract on mice at given doses which can be used as an analgesic effect on Swiss Webster strain mice. Analgetic activity test uses the writing test method which is shown by the contraction of the abdominal wall, both legs are pulled back so that they are occupied. This method was chosen, because it is easy to do for non-narcotic analgesic testing. The principle of this method is to observe a decrease in the amount of writhing that occurs due to intraperitoneal administration of a test substance in the form of 0.5% acetic acid.

Acetic acid was chosen as a pain induction because it is produced from the release of arachidonic acid from tissue phospholipids via the cyclooxygenase pathway and produces prostaglandins in the peritoneal fluid. These prostaglandins can cause pain. The concentration of acetic acid used is in the form of acetic acid with a concentration of 0.5% which can give mice writhing. The injection is done intraperitoneally because absorption occurs fast and constant and the resulting effect lasts a long time.

Animals test used in this study were male white mice which weighed between 20-30 grams and were 2-3 months old. Using male white mice due to more stable conditions compared to female white mice which have menstrual cycles. This aims to minimize differences in the response of test animals to research. If the test animals have been used, the new test animals may be used again for experiments after a certain time interval, namely for 14 days which is commonly referred to as the washing period/washing time.

Before experiencing the animal treatment, the mice were fasted for approximately 12 hours but were still given a drink with the intention that there would be no disturbance, absorption by the influence of food. Mice were grouped into 5 groups, each group consisting of 5 mice. The grouping of the test animals was carried out randomly, this was intended so that each group had the same opportunity to be used as a sample. The negative control group was given Aquadest, the positive control group was given ibuprofen, which served as a comparison of the analgesic power with the samples studied.

The first dose group was 6 mg/30 gram, the second dose was 12 mg/30 gram, the third dose was 24 mg/30 gram which was kangkung extract. Observation of writhing in the test animals was carried out for 1 hour after the test animals were injected with 0.5% acetic acid intraperitoneally. The percentage of writhing was calculated according to the data on the number of writhing formed for 1 hour.

The average number of mice writhing for 1 hour was the result of a negative control with the highest average number of writhing, 140 writhing. This is due to the absence of active substances in the negative control group

treatment using Aquadest. Positive control group had an average of 9 writhing mice, while the first dose was 60 writhing, the second dose was 44 writhing, and the third was 24 writhing.

In the table of test results, the analgetic power sample is found at dose III 24 mg/30 gram, this shows that at the treatment dose I 6 mg/30 gram, dose II 12 mg/30 gram, dose III 24 mg/30 gram has an analgesic effect. The higher the concentration of the extract, it will increasing the potential for pain relief.

The results of the variance homogeneity test that has been carried out show that the data is normally distributed, which is greater than ($p > 0.05$). In the variant homogeneity test obtained using the SPSS application, it obtained significant results, namely ($p > 0.24$), which means that the homogeneous variant of the results obtained was greater than ($p > 0.05$), and the results of the ANOVA test showed significant results. This was indicated by the value obtained, namely ($p < 0.00$) which was smaller than ($p < 0.05$) so that it could be concluded that there was a significant difference between the treatment groups.

The ability of kangkung extract as an analgesic is due to the presence of flavonoids. The mechanism of action of flavonoids is to inhibit the action of the cycloginase enzyme thereby reducing the production of prostaglandins by arachidonic acid thereby reducing pain.

6. Conclusion

Based on the research results it can be concluded that, kangkung extract has an analgesic effect in terms of the decrease in the amount of writhing in male mice induced by acetic acid and kangkung extract which has an analgesic effect is the third dose, which is 24 mg/30 gram.

Acknowledgments

The results of this study can provide benefits for, knowing the analgesic effect contained in kangkung (*Ipomea reptans* Poir), add insight into the effectiveness of traditional plants, especially kangkung that we usually consume. And adding to the literature regarding the effects of kangkung (*Ipomea reptans* Poir) which can cause analgesic effects.

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