***EFFECT TEST STIMULANT OF CURCUMA RHIZOME INFUSION (Curcuma xanthorrhiza Roxb.) ON MALE MICE SWISS STRAIN***

**Neni Lugki Nian Tary dan Tanti Azizah Sujono**

*Fakultas Farmasi, Universitas Muhammadiyah Surakarta,*

*Jl. A. Yani Tromol Pos I, Pabelan, Surakarta 57102*

**ABSTRACT**

*The use of plants efficacious as medicines in the prevention of health problems have been known for a long time the Indonesian people. The utilization of plants as medicine is based on the experience passed down from generation to generation. The use of traditional medicines relatively favored by the people, the underlying factor are traditional medicines have less side effects than the modern medicines if used appropriately.* *Curcuma (Curcuma xanthorrhiza Roxb.) In Indonesia used as refreshment which have stimulant effect*.*. Stimulant is a substance that can stimulate the central nervous system which can speed up the processes in the body and minimize fatigue. Need to research the effects of stimulant infusion of curcuma rhizome. Research conducted using experimental methods pre-test and post-test. Twenty-five male mice Swiss strain used as experimental animals, which are divided into five groups, positive control (caffeine 100mg / kg BW), negative control (distilled water 0,5ml /20g BW), infusion of curcuma dose I (2.5 g/ kg BW), dose II (5g / kg BW), and dose III (10g / kg BW) respectively. Animal experiments tested using methods Natatory Exhaustion and treated with oral route. The resulting effects of stimulant tired calculated the time difference before and after treatment. The data obtained were analyzed using non-parametric statistical tests using Kruskal Wallis and Mann Whitney with a 95% confidence level. Infuse curcuma rhizome have the stimulant effect, the effect obtained by increasing along with the increase in dose. At doses of 2.5 g / kg BW, 5g / kg BW, and 10 g / kg BW be able to provide a stimulant effect respectively by 2.82 minutes, 3.71 minutes and 4.94 minutes. Stimulant effect dose II and III have a greater effect than the positive control (p<0,05), the dose I had similar effect compare with control positive (p>0,05).*

***Keywords: infusion of curcuma rhizome, stimulant effect, Natatory Exhaustion, male mice***

**INTRODUCTION**

The use of plants efficacious as medicines in the prevention of health problems have been known for a long time the Indonesian people*.*. The utilization of plants as medicine is based on the experience passed down from generation to generation. The use of traditional medicines relatively favored by the people, the underlying factor are traditional medicines have less side effects than the modern medicines if used appropriately (Sari, 2006). The other reason because prices of modern drugs more expensive, so purchase of modern drug weakened. Replied many complaints several pharmaceutical industries started to seek the most of effective alternative by look for back to nature as had done of developed countries which applyed the concept (Kartikasari *et al*., 2011). WHO recommend for maintenance of public health, prevention and treatment the disease use traditional medicine. Renewal the global strategy of traditional medicine should be done in order to be used safely and effectively (WHO, 2008).

Stimulant is a substance that can be stimulate the central nervous system which can speed up the processes in the body, can increase the physical and mental abilities, and improve concentration, so that it can make people better prepared, and minimize the fatigue (Sujatno, 2001). Stimulant is an active compound which also influence the overall body organ (Katzung, 2001). Generally public use the stimulants in the form of a supplement drinks with the aim to increase energy and reduce fatigue due to physical working (Setiabudy, 2005).

Until now, the diversity of plants in Indonesia are efficacious as medicine has not been used optimally. This is because the low of public knowledge about medicinal plants (Kartikasari *et al*, 2011). One of them is use of curcuma as a stimulan. In this study simplicia made in the pharmaceutical of curcuma infusion, but many person use curcuma in an infusion (Badan POM RI, 2005), But so far the stimulant efficacy of curcuma based only on empirical experience, so we need study to obtain scientific data about its effect as a stimulant.

**METHODE**

This study classified in the category of experimental research with pre-test and post-test.

1. **Material and Equipment**

infuse of Curcuma rhizome (Curcuma xanthorrhiza Roxb), male mice Swiss strain (20-40 g, 2-3 months). The solvent used distilled water, caffeine 0.4% w/v as a positive control. The tools include electric stove, pans infuse, analytical balance, filter paper, rod stirrer, and glass tools used to make the infusion. To test the stimulant are used tools such as, injection syringes, syringe for orally, stopwatch, thermometer, reservoir, scales and hair dryer.

1. **Preparation of Simplicia**

Curcuma rhizome washed under running water, then cuted into smaller parts, then dried by means inserted into the dryer cabinet with a temperature of 47º C.

1. **Preparation of Curcuma Infusion**

Infusion of curcuma made into several concentrations 10%, 20%, 40%. Making by weighing the dry simplicia according to the concentration that will be created. simplicia weighed each 10 grams, 20 grams and 40 grams, then it boiled with 100 ml of distilled water using a drip pan. Extra water is used 2x the weight of each weighing ingredients, so extra water used is 20 mL for a weight of 10 grams, 40 ml for the weight of 20 grams, and 80 ml for a weight of 40 grams. Simplicia boiled for 15 minutes begins when the temperature reaches 90 ° C while stirred. Contains essential oils of curcuma, then filtered after cold (Depkes RI, 1979).

1. **Preparation of caffein solution stock**

Caffeine weighed 40,0 mg, then dissolved using distilled water in the flask until 10 mL. The dose used was 100mg / kg (Turner, 1965).

1. **Infuse Stimulant Effect of Curcuma test**

Animal test used in this study amounted to 25 male mice Swiss strain. Test animals were divided into 5 groups. Each treatment consisted of 5 mice. The treatment consisted of a positive control using caffeine of 100 mg/kgBW and negative controls using distilled water 0,5ml/20mgBW, and infuse ginger rhizome consisting of three levels, low-dose, medium-dose and high dose. The classification is :

Group I : positive control used caffein solution with concentration 0.4%, a dose of 100 mg/kg BW orally (Turner, 1965).

Group II : negative control used distilled water 0,5ml/ 20mgBW orally.

Group III : Curcuma rhizome infusion with dose of 2.5 g/kgBW, orally.

Group IV : curcuma rhizome infusion with dose of 5 g/kgBW, orally.

Group V : curcuma rhizome infusion with dose of 10 g/kgBW, orally.

One by one, the animals were given a test before treatment included in the reservoir, after the onset of fatigue is characterized by animals test let his head under water for more than 7 seconds (Turner, 1965), then the animals test raised and recorded tired time (t1). Animals test rested for 30 minutes and dried before being treated. The treatment is done orally, the maximum limit provision volume in mice for the oral administration of 1,0 ml (MOH, 1993), and then treated orally and wait for 30 minutes, a time of orientation in order to advance the preparation of drug absorbed (Aznam, 2009), then swam again and noted the tired time (t2). The tired time difference was calculated from before and after being treated (t2-t1).

Tired time difference before and after the treatment is given the test data stimulant effect. This data was obtained from all treatment of all groups of test animals.

1. **Data Analysis**

Quantitative data obtained is the result of the time difference Tired before and after the animals test treated. All data have been collected statistical testing, to determine the data obtained normally distributed or not so tested with Shapiro Wilk method, where as to determine whether or not a homogeneous data obtained so tested using Levene-test.

Data obtained normally distributed, but not homogeneous thus performed data analysis using non-parametric statistical tests. Tests using Kruskal Wallis, because the data obtained significantly different so do the methods Mann Whitney test with 95% confidence level.

**RESULT and DISCUSION**

1. **Extraction of Curcuma Rhizhoma**

Extraction method used in this study is infundation, which is one method that is carried out in a manner extraction for found the active compounds using water. The advantages from this method, among others, the equipment used is quite simple and easy to use, and the extraction method process cheapest.

1. **Animals Endurance Test**

Orientation test of animal endurance aims to determine how long it takes the animals test to restore his stamina as the first time before the animals swam. Rest time is used to minimize error in the base line in 24 hours. On this test using 3 animals that swam for 3 days in a row. The test results orientation breaks the data obtained as in table 1

**Tabel 1.** The results of animals orientation endurance test for 24 hours in a span of 3 days

|  |  |  |  |
| --- | --- | --- | --- |
| Animal number  | t 1 (menit) | t 2 (menit) | t 3 (menit) |
| 1 | 4,37 | 3,96 | 4,18 |
| 2 | 4,80 | 5,28 | 4,18 |
| 3 | 3,12 | 4,95 | 4,03 |
| average | 4,09 | 4,73 | 4,13 |
| SD | 0,87 | 0,68 | 0,08 |

Table 1 shown the data obtained continued statistical test method is paired t test with a level of 95% and get p values> 0,05 indicating that there was no significant difference of the third test time of tired with 24-hour rest period. It can be concluded that energy of animals have returned the same as at the time of animals test before swam with a break for 24 hours.

1. The Results of curcuma infusion stimulant effects test

Natatory Exhaustion method are used in this study because the method is a pharmacological screening methods that can be are used to determine the stimulant effects of a drug or preparation that can activate the body's motor coordination and give the effect of increased work capacity and to minimize fatigue. The results obtained from this method is the data increments Tired in each treatment group. Tired first time (t1) is a time Tired prior to the treatment, while the second time fatigue (t2) is the time Tired after test animals treated. Results increments Tired (Δt) is the data obtained from the difference between Tired first time (t1) and a Tired second (t2). Data from the addition of a Tired test animals presented in table 2.

**Table 2.** Data of tired time after administration infuse ginger rhizome

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Group  | No | t1 (menit) | t2 (menit) | ∆t | $\overbar{X}$ $\pm $ SD |
| Positif control (caffein100mg/kgBW) | 1 | 11,38 | 12,62 | 1,24 | 1,85 ± 0,83  |
| 2 | 7,58 | 9,15 | 1,57 |
| 3 | 8,35 | 9,75 | 1,40 |
| 4 | 6,38 | 8,12 | 1,74 |
| 5 | 4,53 | 7,82 | 3,29 |
| Negatif control (Aquadest 0,5 mL/20gBW) | 1 | 4,22 | 5,58 | 1,36 | -1,23 ± 1,65 |
| 2 | 6,18 | 5,58 | -0,60 |
| 3 | 6,05 | 4,15 | -1,90 |
| 4 | 6,68 | 4,40 | -2,28 |
| 5 | 6,50 | 3,78 | -2,72 |
| Curcuma rhizome infusion 2,5g/kgBW | 1 | 5,37 | 8,97 | 3,60 | 2,82 ± 1,02 |
| 2 | 5,65 | 7,02 | 1,37 |
| 3 | 6,50 | 8,65 | 2,15 |
| 4 | 5,67 | 9,38 | 3,71 |
| 5 | 4,07 | 7,32 | 3,25 |
| Curcuma rhizome infusion 5g/kgBW | 1 | 5,70 | 8,63 | 2,93 | 3,71 ± 0,99 |
| 2 | 5,50 | 9,73 | 4,23 |
| 3 | 4,42 | 9,38 | 4,96 |
| 4 | 7,13 | 9,65 | 2,52 |
| 5 | 3,95 | 7,85 | 3,90 |
| Curcuma rhizome infusion 10g/kgBW | 1 | 3,43 | 6,18 | 2,75 | 4,94 ± 2,06 |
| 2 | 3,60 | 7,35 | 3,75 |
| 3 | 3,23 | 7,18 | 3,95 |
| 4 | 2,93 | 10,42 | 7,49 |
| 5 | 3,43 | 10,18 | 6,75 |

This study was conducted with the aim of knowing the possible cause and effect of various treatment groups. The groups treated with ginger rhizome and infuse positive control than the negative control group.

 Animals test was swam Natatory Exhaustion method can show the effect of the preparation on the coordination of movement between before and after treatment (Aznam, 2009). Animal physical endurance test in activity is different, it can be influenced among other things test animals age, the older the test animals, the ability to move a muscle for defense condition is also declining. The ability of each test animals in absorbing preparations also differ, depending on the health condition of the animal itself.

The data result of stimulant effect test from positive control, negative control, and provision infuse ginger rhizome with 3 different dose levels can be seen in Table 2. In accordance with the data shown in Table 2 shows the addition of a Tired at each treatment group, except in the control group negative. Extension of time Tired indicated by the difference in time when the test animals Tired before treatment and after being treated.

Time tired obtained after treatment is greater than the time tired before treatment, except in the negative control no additional time tired. Negative controls containing distilled water did not show any additional time tired, which means distilled water has no stimulant activity to prolong tired test animals. In contrast to the positive control that used caffeine, the data obtained indicate the presence of extra-time tired after the treatment, because caffeine has activities in increased metabolism and can reduce fatigue. The same is also indicated in the treatment group using the infusion of ginger rhizome with 3 different dose levels.

The data have been obtained were tested with statistical methods. Testing is done by using parametric statistical methods Shapiro-Wilk test for reasons the amount of data that is processed is less than 30. From the Shapiro-Wilk test obtained significance value of 0.275 in order to obtain results p> 0.05, which means the data processing result normally distributed, but the data processing with the test Levene test for homogeneity test result of 0.034 (p <0.05), so that the data processing show results that are not homogeneous. Not homogeneous due to the data obtained, the data and then tested with a non-parametric statistical method using the Mann-Whitney test. Results of Mann-Whitney test can be seen in Table 3.

**Table 3.** Data statistical test by Mann-Whitney method

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| group | I | II | III | IV | V |
| I |  | **0,016** | 0,175 | **0,028** | **0,016** |
| II |  |  | **0,009** | **0,009** | **0,009** |
| III |  |  |  | 0,175 | **0,047** |
| IV |  |  |  |  | 0,465 |
| V |  |  |  |  |  |

information:

group I : Positif control (kafein 100mg/kgBB)

group II : Negatif control (aquadest 0,5mL/20g BB)

group III : Curcuma rhizome infusion2,5g/kgBW

group III : Curcuma rhizome infusion 5g/kgBW

group IV : Curcuma rhizome infusion 10g/kg BW

From the data presented in Table 3 indicates that each treatment group using the infusion of ginger rhizome has a significant difference to the negative control group with p <0,05, which means that infuse a dose of ginger rhizome 2,5g/kg BW, 5g/kgBW and 10g/kgBW was able to increase the time Tired, while the treatment using infusion of ginger rhizome at 3 different dose levels also have a significant difference to the positive control because the obtained values (p <0,05), which means infuse a dose of 5g/kgBW and 10g/kgBW was able to increase the time Tired is greater than the positive control, except at doses of 2,5G/kg obtained values (p> 0,05), which means the effect is equivalent to the positive control.

The average difference time Tired throughout the test animals that had been treated infuse ginger rhizome shown in Figure 1.

**Figure 1**. Histogram stimulant effect infuse of curcuma rhizome

Figure 1 shown it can be observed if the infusion of ginger rhizome has a stimulant effect, except in the negative control was not very aesthetically their stimulant effect. The histogram shows that the stimulant effect increased with the increasing dose.

Based from previous study, qualitative analysis ginger rhizome contains alkaloid compounds and triterpennoid (terpenoids) are dominant (Hayani, 2006). The content of chemical compounds in ginger are believed to have stimulant effects are alkaloids and triterpennoid. Active compound class of alkaloids and terpenoids are responsible for the increase in stimulant activity in test animals male mice Swiss strain (Nuria, 2013).

**CONCLUSION**

The results of research conducted as well as the discussion that has been described can be deduced that infuse a dose of ginger rhizome 2.5g/kg BW; 5g/kg BW; 10g/kgBW has a stimulant effect on the male mice Swiss strain.

**ADVICE**

This study needed regarding any compounds contained in curcuma rhizome are responsible for providing stimulant effect.

**ACKNOWLEDGMENT**

The author acknowledge Pharmacy Faculty Muhammadiyah University of Surakarta for supporting the research equipment and all of facility.

**REFERENCES**

Aznam, N., 2009, Stimulant Effect of Pasak Bumi (*Eurycoma longifolia*. Jack) Root Powder by Natatory Exhaustion at Male Mice, *Isstec*

Badan POM RI, 2005, *Info POM*, 3, Jakarta, Badan POM Republik Indonesia

Depkes RI, 1979*, Farmakope Indonesia Edisi III*, 63-67, Jakarta, Departemen Kesehatan Republik Indonesia

Depkes RI, 1993, Penampisan Farmakologi, *Pengujian Fitokimia dan Pengujian Klinik*, 19-21, Departemen Kesehatan Republik Indonesia, Jakarta

Hayani, E., 2006, Analisis Kandungan Kimia Rimpang Temulawak, *Pusat Penelitian dan Pengembangan Peternakan*, 309-312

Kartikasari, R., Hikmat, A., Zuhud, E. A. M., Siswoyo., & Sandra, E., 2011, Revitalisasi Konservasi Tumbuhan Obat Keluarga (TOGA) Guna Meningkatkan Kesehatan dan Ekonomi Keluarga Mandiri di Desa Contoh Lingkar Kampus IPB Darmaga Bogor, *Jurnal Ilmu Pertanian Indonesia*, 16 (2), 71-80

Katzung, B., 2001, *Farmakologi Dasar dan Klinik*, Salemba Medika, Jakarta

Nuria, M. C., Anas, Y., Puspitasari, N., 2013, Aktivitas StimulansiaEkstrak Etanol Bunga dan Daun Cengkeh (Syzygium aromaticum (L) Merr. & Perry.) pada Mencit Jantan Galur Swiss Beserta Identifikasi Golongan Senyawa Aktifnya, *Jurnal Ilmu Farmasi dan Farmasi Klinik*, 10 (1), 13-22

Sari, L. O. R. K., 2006, Pemanfaatan Obat Tradisional dengan Pertimbangan Manfaat dan Keamanannya, *Majalah Ilmu Kefarmasian,* 3 (1), 01-07

Sujatno, M., 2001, Pengaruh Penggunaan Doping Terhadap Penampilan Atlet pada Pekan Olah Raga Nasional XIV/1996 dan South East Asian Games XIX/1997 di Jakarta, *JKM,* 1 (1), 32-38

Turner, R. A., 1965, *Screening Methods in Pharmacology, Volume, Hal 76-77*, New York and London, Academic Press

WHO, 2008, *Tradisional Medicine*, 11-12, Geneva, World Health Organization