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ANTIOXIDANT EFFECT OF LONGAN PERICARP EXTRACT IN PARACETAMOL-INDUCED IN RATS

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ABSTRACT

Background: Oxidative stress is a condition which were free radicals harm biological molecules, like lipid, protein, and DNA. Consume paracetamol can increase oxidative stress, which can cause increased level of AST and ALT serum. Longan pericarp (Dimocarpus longan L.) is one of natural ingredients that contain phenolic and flavonoids as an antioxidant to prevent oxidative stress. This study aims to prove the effect of longan pericarp (Dimocarpus longan L.) on AST and ALT serum levels of Wistar rats induced paracetamol. **Methods:** Experimental research with post-test only control group design. Thirty males wistar aged 2-3 months weighing 140-250 grams randomly divided into 5 groups. Group K1 was normal control group. Group K2 was induced by paracetamol 2000 mg/kgBW. Group P1, P2, P3 were induced by paracetamol 2000 mg/kgBW administered by longan shell extract (Dimocarpus longan L.) in multilevel dose 5 mg/200 gBW, 10 mg/200 gBW, and 15 mg/200 gBW. Blood samples in each group were collected to measure AST and ALT serum levels of wistar rats. **Results:** There were signifficant differences groups of AST serum. There were signifficant difference groups of K1-K2 (p=0,000), K2-P2 (p=0,041), and K2-P3 (p=0,010). There were signifficant differences groups of ALT serum. There were signifficant differences groups of K1-K2 (p=0,001), K2-P2 (p=0,032), and K2-P3 (p=0,006). **Conclusions:** The longan pericarp extract can lower the AST and ALT serum levels of Wistar rats induced by paracetamol.
Keywords: ALT; AST; longan pericarp extract; paracetamol.

INTRODUCTION

Oxidative stress is a condition that free radicals attack biological molecules, like lipid, protein, and DNA. Oxidative stress occur when there was free radicals and antioxidant imbalance in the body.[1,2] Drugs consumption, like paracetamol can cause oxidative stress increased and can cause hepatocyte cell membrane damage. So, the hepatocyte cell membrane pemeability increased, and then enzymes in the liver, including AST and ALT will be released to the blood supply. So that the levels of AST and ALT serum rise.[3,4]

Oxidative stress can reduced by consuming antioxidant. Antioxidant molecules can protect cell from damage, because antioxidant netralize free radicals by donating hydrogen to atom that does not pairing to another electron. There is high antioxidant levels on plants, especially on pericarp. Antioxidant activity related to phenolic and flavonoid agent on longan pericarp.[5]

Many natural resources used in society to improve health, protect the body from diseases. Longan pericarp is one of natural resource that can be used to increase antioxidant levels in the body to reduce free radicals levels and prevent liver damage caused by stress oxidative. However, longan pericarp is underused and often become waste.[6]

Therefore, the writer wants to know the effect of longan pericarp extract (*Dimocarpus longan L.*) to AST and ALT serum levels on wistar rats that induced by paracetamol.

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METHOD

Experimental animals and study design

This research is experimental reaserch with Post Test Control Group Design approach. Thirty male Wistar rats (*Rattus norvegicus*) aged minimal 8 weeks, weighing 140-250 grams, healthy and active randomly divided into 5 groups. Each group consists of 6 rats. Twenty four rats carried out the induction with paracetamol. The rats had not received treatment before. Exclusion criteria : the rats have some anatomical abnormalities. Dropout criteria : rats that died during the experiment. Rats were divided into 5 groups randomly, where each group consisted of 6 rats to be treated as follows;

a. K1: Normal control group, were administered standard diet for 14 days.
b. K2: Negative control group, were administered standard diet and induced by paracetamol 2000 mg/kgBW on day-14.
c. P1: First treatment group, were administered longan pericarp extract with 5 mg/200 grBW dose for 14 days and induced by paracetamol 2000 mg/kgBW on day-14.
d. P2: Second treatment group, were administered longan pericarp extract with 10 mg/200 grBW dose for 14 days and induced by paracetamol 2000 mg/kgBW on day-14.
e. P3: Third treatment group, were administered longan pericarp extract with 15 mg/200 grBW dose for 14 days and induced by paracetamol 2000 mg/kgBW on day-14.

Longan Pericarp Extract (Dimocarpus longan L.) Preparation

Longan pericap (*Dimocarpus longan L.*) washed and separated form the pericarp. Then, the longan pericarp thin cut and dried in chamber temperature. Longan pericap extracted by soxhlet method. We used alcohol 95% for this method. Then, put the sample that wrapped in the filter paper to soxhlet tube. Next, put the sample in the porcelain cup and evaporate in water bath with 80^{o}C until form some paste.

Statistical Analysis

*One-Way Analysis of Variance (*ANOVA) and *Kruskal-Wallis* were used for statistical analysis. Statistical analyses were done using SPSS version 22.0 for windows.

Ethical Clearance

This research has been accepted and given an ethical clearance from Komisi Etik Penelitian Kesehatan (KEPK) Faculty of Medicine, Diponegoro University with ethical clearance number is 64/EC/H/KEPK/FK-UNDIP/V/2019 on May, 21st 2019.

RESULT

Longan Pericarp Extraction

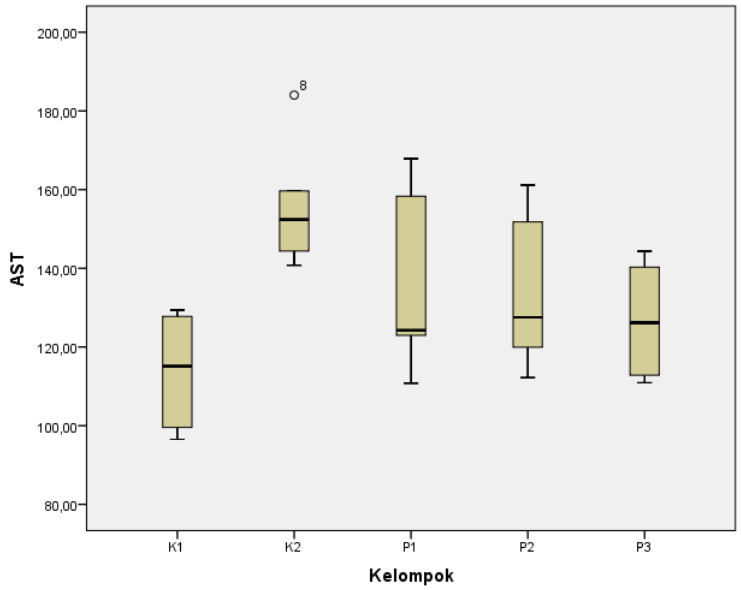
Yield is a ratio between quantity of extract resulting from extraction process. Yield obtained by compare the extract weight with dried and mashed up material multiplied 100%.[7] Yield of longan pericarp extraction can be seen in Table 1

Table 1. Total Yield of Longan Pericarp Extraction

Solvent	Material	Dried weight (gram)	Extract weight (gram)	Yield (%)
Etanol 96%	Longan pericarp	215,3386	16,43	7,62

AST Serum Levels

Data analysis of AST serum levels can be seen in Graph 1.



Graph 1. AST Serum Levels Mean

One Way ANOVA parametric test shows signifficant difference between groups (p=0,009). Then further data analysis will be continued using the Post Hoc Test to assess meaningful differences between the 2 groups.

Table 2. Post Hoc Result for AST Serum Levels

Groups (n=6)	AST Serum Levels (U/L)	K1	K2	P1	P2
K1	113,91 ± 15,51	-	-	-	-
K2	155,60 ± 15,81	0,000*	-	-	-
P1	134,74 ± 22,74	0,054	0,054	-	-
P2	133,37 ± 19,55	0,071	0,041*	0,895	-
P3	126,78 ± 14,28	0,223	0,010*	0,447	0,529

Information: p<0.05; Significant

Based on the Post Hoc Test, the results showed that there were significant differences between the K2 group with K1 (p<0,001), K2 with P2 (p = 0.041), K2 with P3 (p = 0,010) which meant there were significant differences in the group induced paracetamol but not given longan pericarp extract (K2) with the group induced paracetamol and given longan pericarp extract with 10 mg/200 grBW dose (P2) and 15 mg/200 grBW dose (P3)

ALT Serum Levels

Data analysis of ALT serum levels can be seen in Graph 2.

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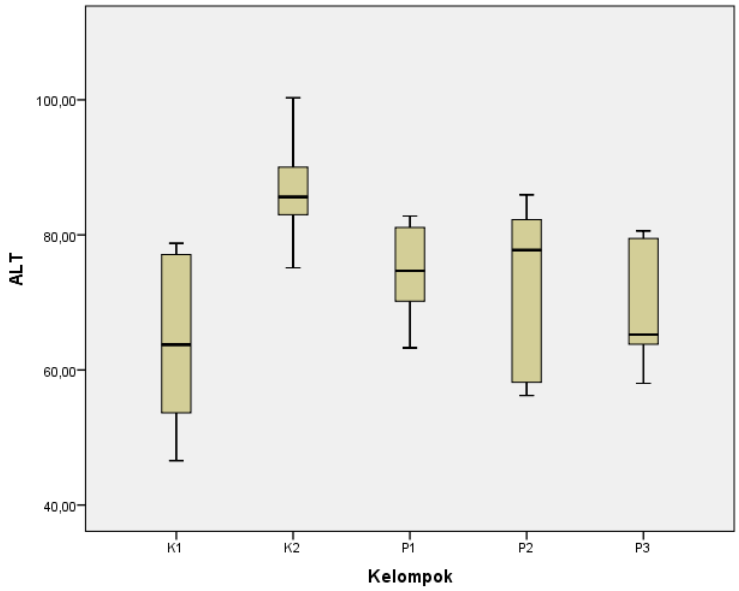

Graph 2. ALT Serum Levels Mean

One Way ANOVA parametric test shows signifficant difference between groups (p=0,012). Then further data analysis will be continued using the Post Hoc Test to assess meaningful differences between the 2 groups.

Table 3. Post Hoc Result for ALT Serum Levels

Kelompok (n=6)	Kadar ALT Serum Tikus (U/L)	K1	K2	P1	P2
K1	63,92 ± 12,65	-	-	-	-
K2	86,61 ± 8,40	0,001*	-	-	-
P1	74,45 ± 7,63	0,090	0,053	-	-
P2	73,01 ± 12,75	0,141	0,032*	0,812	-
P3	68,73 ± 9,15	0,429	0,006*	0,348	0,480

Information: p<0.05; Significant

Based on the Post Hoc Test, the results showed that there were significant differences between the K2 group with K1 (p=0,001), K2 with P2 (p = 0.032), K2 with P3 (p = 0,006) which meant there were significant differences in the group induced paracetamol but not given longan pericarp extract (K2) with the group induced paracetamol and given longan pericarp extract with 10 mg/200 grBW dose (P2) and 15 mg/200 grBW dose (P3).

DISCUSSION

This study aimed to determine the AST and ALT serum levels of paracetamol-induced wistar rats in the given of longan pericarp extract. The results showed that the paracetamol induced group had higher AST and ALT serum levels than the normal control group. This was in accordance with previous studies where toxic dose of paracetamol 2000mg / kgBW in wistar rats can AST and ALT serum levels.[8] K1 were

induced by paracetamol continued to increase of AST and ALT serum levels, it can be concluded that paracetamol can work more effectively to increase AST and ALT serum levels.

Longan pericarp extract contains phenolic and flavonoid which act as an antioxidant. Phenolic compounds can donate hydrogen atom to free radicals that does not have electron pair, so the new molecules will be more stable. Phenolic compounds as an antioxidant can also interacted to protein in the body, so can prevent the enzyme that plays a role in free radicals form, like *lipooxygenase*, *cyclooxygenase*, and *xanthine oxidase*.[9] This result match to the previous research that phenolic and flavonoid compounds can decrease AST and ALT serum levels in wistar rats.[10,11]

The results showed that longan pericarp extract had a therapeutic effect in reducing AST and ALT serum levels. Negative control groups who were not given therapy experienced an increase in AST and ALT serum levels, while the treatment group was given a therapy of longan pericarp extract with 5 mg / 200grBW, 10mg /200grBW, 15 mg/200grBW doses can reduce AST and ALT serum levels in paracetamol-induced wistar rats. Based on data analysis all the doses above can significantly reduce uric acid levels but did not find significant differences between groups P1, P2, and P3. However, when we observed from the means of AST and ALT serum level, the AST and ALT levels serum difference between the groups, and from the average p value obtained, the P3 group given a longan pericarp extract with a dose of 15 mg /200grBW was the best result.

CONCLUSIONS

From this study we can conclude that longan pericarp extract can reduce AST and ALT serum levels in paracetamol-induced wistar rats.

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