

# Acute Toxicity Study of *Durian Mesocarpium Ethanol Extracts (Durio Zibethinus Linn)* in Healthy Mice

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## ABSTRACT

*Durian (Durio zibethinus Linn.)* has been shown to have toxicity effect on acute toxicity *in vivo*. **Objective:** This study aimed to determine the acute toxicity of the *Durian Mesocarpium Ethanol Extracts (EEMD)*, various doses of *Durian Mesocarpium Ethanol Extracts (EEMD)* by examining *in vivo* to the healthy mice experimentally. The toxic effects appeared in a short time after 24 hours by oral administrations of the dosages. This study used completely randomized design. The animals used in this study were mice (*Swiss Webster*), with criteria are healthy, male, and the range of the ages were 2 – 3 months with the body weight 20 – 30 g. The various dosages of *Durian Mesocarpium Ethanol Extracts (EEMD)* were divided into six experimental groups to determine the LD<sub>50</sub> there are K- (NaCMC); P1 (100 mg/KgBW); P2 (200 mg/KgBW); P3 (400 mg/KgBW); P4 (800 mg/KgBW); P5 (1600 mg/KgBW). The result showed that *Durian Mesocarpium Ethanol Extracts (EEMD)* has LD<sub>50</sub> 400 mg/KgBW which included in moderate toxicity with effect like tremor which is one of type acute toxicity due to healthy mice. **Conclusion:** Based on these results, *Durian (Durio zibethinus Linn.)* have moderate toxicity after 24 hours oral administration dosages.

**Keywords:** Acute Toxicity, *Durian Mesocarpium*, Ethanol Extracts, LD<sub>50</sub>.

## 1. INTRODUCTION

Nowadays, medicine therapy paradigms or strategy in the treatment of the diseases has changed by the time. The synthetic drugs usually used in treating the diseases have higher effectivity in the treatment. However, there are so many health problems caused by long term use of its. Based on [1] there is an increase in herbal formulations consumption because of their effectivity in treating the diseases meanwhile they are organic and harmless [2] they are also less damaging and safer than synthetic drugs with less side effects to the biological system in our body [3] Indonesia, as one of the developing countries in South East Asia Nations, its known as a tropical country with many medicinal plants.

One of the medicinal plants in Indonesia and become commodity plants is *Durian*. It has been used alternatively as traditional medicines. The previous study reported that *Durian* has some activities like antibacterial [4] anti-inflammation [5][6] antioxidant [5][6] anti hyperuricemia [7], etc. *Durian* contains many metabolic seconder compounds such as esters ethyl propanoate, methyl-2-methylbutanoate, propyl propanoate, sulphur compounds (diethyl disulphide, diethyl trisulphide and ethanethiol), thioacetals (1-(methylthio)-propane),

thioesters (1-(methylthio)-ethane), thiolanes (3,5-dimethyl-1,2,4-trithiolane isomers), alcohol (ethanol) [8][9][10] and polyphenols (flavonoids, phenolic acid, tannins, and other bioactive components). Based on epidemiological studies, the polyphenols compound has effectivity in the treatment of chronic diseases such as cancers, cardiovascular diseases and diabetes [10][11][12][13][14][15]. Toxicity study from the Malvaceae family has reported having moderate toxicity to female rats with LD<sub>50</sub> values of 850.90 mg/kg BW [16]. However, there are limited studies have been reported about toxicity of its bioactive compounds. This study aims to assess the acute toxicity effect of *Durian mesocarpium* in healthy mice to get more scientific information about the evaluation of its toxicological implications.

## 2. METHODS

### 2.1. Material

*Durian* rinds (*Durio zibethinus L.*) consists of ethanol distillate 70%, Na CMC, aquadest. *Durian* rinds samples were obtained from Simpang Selat Village, Jaluko District, Muaro Jambi Regency, Jambi Province.

For the ethanol extract preparation, formula *Durian* rinds 40 kg (*Durio zibethinus* L.) macerated in ethanol 70%. Extraction was initiated with ethanol solvent in 24 hours. This process is repeated in three times until colorless. Then, it was thickened with a rotary evaporator to obtain the viscous extract.

**2.2. Animal**

The animals used were 36 healthy male white mice with a body weight of 20-30 grams and aged 5-6 weeks. Before being given the treatment, the animals were acclimatized for 7 days.

**2.3. Acute Toxicity Study**

This study uses post-test only controlled group design using 36 animals. The animals were divided into six treatment groups with consist of six mice:

- 1. K- (Negative Control): Na CMC 0.5%
- 2. P1 group : EEMD 100mg/KgBW
- 3. P2 group : EEMD 200mg/KgBW
- 4. P3 group : EEMD 400mg/KgBW
- 5. P4 group : EEMD 800mg/KgBW
- 6. P5 group : EEMD 1600mg/KgBW

The animals were fasted from food but they still drank water. Then, the animal was weighed and given a test preparation. After getting the treatment, the food was given back after 1-2 hours. The symptoms of toxicity that

appeared in mice were observed periodically for the first 4 hours and once a day for 7 days. Toxicity symptoms were observed, such as mice becoming silent, tremor, grooming, weakness, diarrhea, twitching in the body of the mice, changes in skin and eye color, diarrhea and death. The LD<sub>50</sub> value is determined by counting the number of animal deaths for 24 hours due to the provision of the test preparation at each doses level [17].

The Thompson Weil Method used to determine the LD<sub>50</sub>.

$$\text{Log } m = \text{Log } D + d (f + 1) \dots\dots (1)$$

**2.4. Data Analysis**

The data were analysed and represented in the tables descriptively.

**3. RESULTS**

**3.1. The Non Specific Parametric**

Based on the result obtained, the crude extract of mesocarpium *Durian* rinds have a water content of 8.87% and ash content of 15% (Table 1). It was found that the crude extracts used in this study contained metabolic seconder compounds, such as alkaloids, flavonoids, saponins, tannins and phenolics.

**Table 1.** Non Specific Parametric

Parameter	Analysis Result (%)
Water Percentage	8.87
Ash Percentage	15.00

**3.2. Acute Toxicity Treatment**

**Table 2.** Percentage of Accumulation in Treatment Groups (%)

Parameters	Percentage of Accumulation in Treatment Groups (%)					
	K	P1	P2	P3	P4	P5
Silent	0	43.33	16.67	56.67	53.33	30
Tremor	0	0	0	0	3.33	6.67
Grooming	0	10	6.67	20	30	50
Lethargy	0	0	3.3	6.7	3.3	23.3
Sleep	0	0	0	0	0	6.67
Diarrhea	0	0	0	0	0	0
Somatomotor activity	0	0	10	3.33	6.67	0
Changes in skin and fur	0	0	0	0	0	0
Salivation	0	0	0	0	0	0

Mostly, the percentage of accumulated symptoms has increased in each treatment group and the highest percentage of accumulation is shown in the P5 treatment group, where this is due to the high dose of ethanol extract of mesocarpium *Durian* to experimental animals. The value of LD<sub>50</sub> was obtained from the number of dead and living mice in each group. Furthermore, the LD<sub>50</sub> The

(Table 2). Therefore, the highest percentage that shown one of toxicity effect which is silent effect was P3 with 56.67%, but for grooming was P5 with 50%.

### 3.3 Determination of LD<sub>50</sub>

LD<sub>50</sub> value is calculated using the *Thompson-Weil* method (Table 3).

**Table 3.** Number of Death

Groups	Number of Mices	Doses (mg/20 g BW mices)	Number of Death
K	6	0	0
P1	6	100	0
P2	6	200	0
P3	6	400	1
P4	6	800	1
P5	6	1600	2

The LD<sub>50</sub> value obtained from the *Thompson-Weil* calculation is 400mg/kgBW and included in the moderate toxic category.

## 4. DISCUSSION

Based on our study, the toxicity symptoms that appeared during the observation probably caused by the flavonoid compounds present in the *Durian* rinds. The acute toxicity effect in each treatment group reported in this study showed that the number of deaths increases as the dose increases. Thus, influenced by the role of the flavonoid compounds contained in this EEMD sample. The flavonoid compound has activities that cause depression in the central nervous system [18][19]. The occurrence of depression can cause cell death due to the cessation of active transport mechanisms in delivering and entering ions in the body. Flavonoid compounds have reported in depressing the central nervous system [19]. Flavonoids contain phenolic compounds. Excessive flavonoids in the cell environment cause the -OH group on the flavonoids to bind to the cell membrane integral protein [20]. It causes active transport to be blocked. The interrupted active transport causes uncontrolled entry of ions into the cell, which leads to cell death. The result that we obtained showed variation value, which means that EEMD samples were still in crude extracts, that might be potentially inhibition by other compounds in it.

## 5. CONCLUSION

The result showed that *Durian* Mesocarpium Ethanol Extracts (EEMD) has LD<sub>50</sub> 400 mg/KgBW which included in moderate toxicity category with effect like tremor which is one of type acute toxicity due to healthy

mice. Based on these results, *Durian* (*Durio zibethinus* Linn.) has moderate toxicity after 24 hours oral administration dosages.

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