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DIURETIC EFFECTIVENESS TEST OF LEUCARE LEUCABETH (Leucaena leucocephala (Lam.) de Wit) ETHANOL EXTRACT ON MALE WHITE RATS (*Rattus norvegicus*)

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ABSTRACT

Leucaena leucaena seeds are widely believed to be a plant that can treat various ailments, including diuretics. Leucaena seeds contain a high amount of alkaloids, saponins, flavonoids, tannins, protein, fat, calcium, phosphorus, iron, amino acids, and leucanol. The purpose of this study was to determine whether ethanol extract of leucaena seeds can have a diuretic effect on male white rats. This study used 30 male white rats divided into five groups: Group I (solvent control) with 1% CMC. Group II (comparison) with furosemide. Groups III, IV, and V (treatment) were given ethanol extract of leucaena seeds at doses of 150 mg/kg BW, 300 mg/kg BW, and 600 mg/kg BW, respectively. The test preparations were administered orally using a metabolic cage equipped with a rat urine collector. Observations were made every hour for 8 hours to determine total urine volume. The urine volume of each group was statistically analyzed using ANOVA and the LSD test. The results of the statistical test of urine volume between the furosemide and ethanol extract groups of lamtoro seeds (Leucaena leucocephala (Lam.) de Wit) showed no significant difference. From the results of the study, it can be concluded that the higher the concentration of EEBL suspension given, the more urine volume will be produced, and when the EEBL suspension was given at a dose of 600 mg/kg BW, the results were almost comparable to the group of animals given furosemide suspension.

Keywords: Diuretic Effect, Lamtoro Seeds, Male Rats, ANOVA, BNT

I. INTRODUCTION

Indonesian culture has extensively utilized plants to maintain health and treat various ailments. Of the forty thousand species of flora found worldwide, thirty thousand are found in Indonesia. Approximately 26% have been cultivated, while the remaining 74% still grow wild in forests. Of these, more than 940 species are cultivated and used in traditional medicine. Medicinal plants deemed safe for use are preserved, while plants that have healing properties but can cause side effects are generally not widely used (1,2,3).

The use of traditional medicine in Indonesia has essentially been a traditional practice passed down through generations. The obvious advantage of using these remedies is their relatively minimal side effects compared to modern medicine. Traditional medicine utilizing medicinal plants is a treatment utilized and recognized by the global community for achieving optimal health and naturally treating a variety of ailments (5,6,7).

Although some traditional medicines have been empirically shown to cure various diseases, their efficacy and safety have not been clinically proven, and the exact compounds responsible for their effectiveness are still largely unknown. Therefore, modern medicine and pharmacy have extensively studied traditional medicines, and plants have been scientifically studied. The results support the belief that medicinal plants do indeed contain substances or compounds clinically proven to be beneficial to health (8,9,10).

One of the plants used by local people as a traditional medicine is the lamtoro (Leucaena leucocephala (Lam.) de Wit). Besides being readily available, lamtoro also offers numerous benefits. This plant has a slightly

bitter taste and is neutral in nature. Among its benefits are its ability to expel urine (diuretic) and treat intestinal worms. Leucaena is a shrub rich in alkaloids, saponins, flavonoids, tannins, protein, fat, calcium, phosphorus, iron, amino acids, and leucanol.

Ethnobotanically, people have widely used the lamtoro plant as medicine, including as a wound remedy, diuretic, and anti-inflammatory. This medicine is made by finely grinding, chewing, boiling, or kneading the plant, then applying it directly to the injured area. All parts of the lamtoro plant can be used to treat several ailments, but the seeds are the most commonly used diuretic (11,12,13).

Diuretics are substances that increase urine output by acting directly on the kidneys and are commonly used in patients with hypertension (14,15,16). This disease is the most common cause of death in Indonesia. The primary function of diuretics is to mobilize edema fluid, which means altering fluid balance so that fluid volume returns to normal (17,18). Based on the background description above, the researchers were interested in conducting a study to determine the diuretic effect of ethanol extract of lamtoro seeds. Male white mice were used as test animals.

II. METHOD

The study was conducted using a laboratory experimental method, using a research design in the form of a BNT Test. The total number of samples used in the study was 1 sample; randomly grouped into 5 groups, each group consisting of 5 white mice and given treatment orally. The test animals used in the study were fasted without food for ± 18 hours but were still given water ad libitum, then the weight of the mice was weighed. Each mouse was given treatment which was divided into 5 groups, namely the solvent control group given 1% CMC, the positive control group given furosemide suspension, and the administration of the suspension of the test material ethanol extract of lamtoro seeds at a dose of 150 mg/kg BW, 300 mg/kg BW, 600 mg/kg BW (19,20).

Results of Identification of the type of lamtoro plant taken from Matang Seulimeng Village, Lr. TPI, Langsa City, Aceh Province. Fresh materials were collected, washed thoroughly under running water, drained, and weighed (5,000 g). Simplicia of lamtoro seeds was made by collecting 5 kg of lamtoro seeds, cleaning them from dirt (wet sorting), then washing them with running water until clean, draining them, then cutting them into small pieces, weighing them, and drying them in a drying cabinet at a temperature of around 600C until dry, that is, when squeezed, they felt brittle and crushed. After drying, the lamtoro seeds were sorted dry, then ground using a blender and sieved, obtaining simplicia powder stored in a dry glass container protected from light.

Treatment procedures on the test animals used in the study were fasted without food for ± 18 hours but were still given water ad libitum, then the weight of the mice was weighed. Each mouse was given treatment which was divided into 5 groups, namely the solvent control group given 1% CMC, the positive control group given furosemide suspension, and the administration of the suspension of the ethanol extract of lamtoro seeds at a dose of 150 mg/kg BW, 300 mg/kg BW, 600 mg/kg BW. Then the mice were placed in a modified metabolic cage. Measurement of urine volume was carried out at hours 1, 2, 3, 4, 5, 6, 7, and 8. The urine volume measured was the urine volume at each observation time.

III. RESULTS AND DISCUSSION

After conducting observations regarding the diuretic effect test of ethanol extract of avocado leaves (Leucaena leucocephala (Lam.) de Wit) on white rats (Rattus norvegicus), the following results were obtained :

3.1 Observation Results of the Time of Diuretic Occurrence

Observation of the onset time of diuretic action was carried out by recording the initial time of urine output (in hours). The results can be seen in Table 1.

Tabel 1 Urine Volume Results for Each Observation Time

Hour to -	Control CMC 1% (ml)	Suspensi Furosemid (ml)	EEBL 150 mg/kg BB (ml)	EEBL 300 mg/kg BB (ml)	EEBL 600 mg/kg BB (ml)
1	0,00	0,95	0,23	0,51	0,81
2	0,00	1,21	0,32	0,62	0,90
3	0,06	1,47	0,45	0,69	1,06
4	0,11	1,64	0,53	0,77	1,30
5	0,17	1,77	0,67	0,94	1,47
6	0,21	1,87	0,73	1,14	1,62
7	0,40	1,99	0,81	1,33	1,77
8	0,61	2,09	0,93	1,50	1,86

Based on the data on the total urine volume produced, it can be said that EEBL provides a diuretic effect, namely increasing the volume of urine excreted by mice more optimally compared to the total urine volume of the solvent control group..

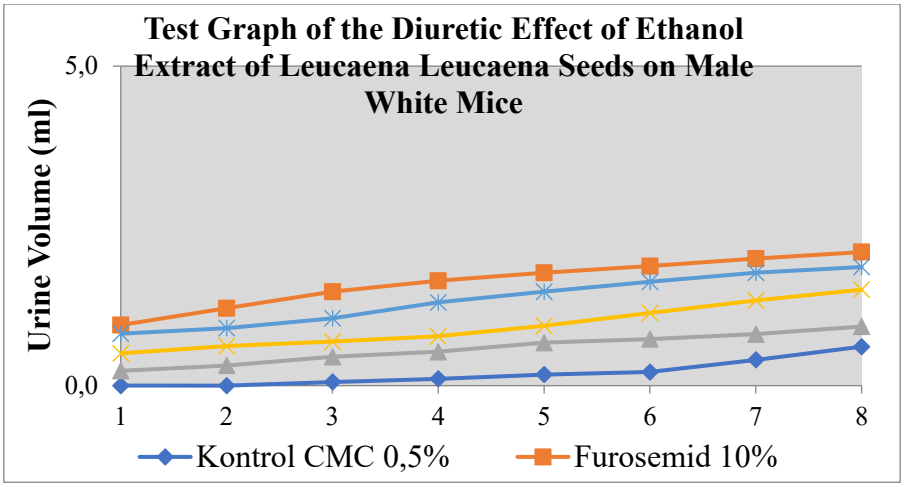

Figure 1 Graph of Average Hourly Urine Volume for 8 Hours

The data above shows that the group of animals given EEBL suspension at a dose of 150 mg/kg BW showed a diuretic effect, with a faster onset of diuretic action compared to the group given 1% CMC suspension.

The higher the concentration of EEBL suspension, the greater the volume of urine produced. The results of EEBL suspension at a dose of 600 mg/kg BW were nearly comparable to those given furosemide suspension. The group given furosemide suspension performed more optimally than the group given EEBL suspension.

3.2 Statistical Test

The data obtained from the research were statistically tested using analysis of variance (ANOVA) to determine whether there were differences in urine volume across all treatment groups. Furthermore, to identify which groups differed from each other, a Least Significant Difference (LSD) test was used.

Tabel 2 Analysis of Variance (ANOVA) Test Results

Hour To-	F_0	F tabel	
		5%	1%
6	120,86	2,76	4,18
7	89,21	2,76	4,18
8	250,08	2,76	4,18

Description:

The table above shows that the results of the analysis of variance (ANOVA) from the 6th to the 8th hour show that all Fo values are greater than the 5% F-table = 2.76 and the 1% F-table = 4.18, resulting in a significant difference in the percentage change in urine volume between each test material. Therefore, a Least Significant Difference Test (LSD) is needed to determine which groups exhibited different or similar percentage changes in urine volume. Data and LSD test calculations.

Tabel 3. BNT Test Results Time of Diuretic Occurrence

Hour To-	Treatment	% Volume Urine Mean	Difference With				
			CMC	Furosemid	EEBL 150 mg/kg BB	EEBL 300 mg/kg BB	EEBL 600 mg/kg BB
	CMC	0,21	-	-	-	-	-
	Furosemid	1,87	1,66	-	-	-	-
6	EEBL 150 mg/kg BB	0,73	0,52	-1,14	-	-	-
	EEBL 300 mg/kg BB	1,14	0,92	-0,73	0,41	-	-
	EEBL 600 mg/kg BB	1,62	1,41	-0,25	0,90	0,49	-
	BNT $_{0,05}$ =	0,09		BNT $_{0,01}$ =	0,12		
	CMC	0,40	-	-	-	-	-
	Furosemid	1,99	1,58	-	-	-	-
7	EEBL 150 mg/kg BB	0,81	0,40	-1,18	-	-	-
	EEBL 300 mg/kg BB	1,33	0,93	-0,66	0,53	-	-
	EEBL 600 mg/kg BB	1,77	1,36	-0,22	0,96	0,44	-
	BNT $_{0,05}$ =	0,11		BNT $_{0,01}$ =	0.15		
	CMC	0,61	-	-	-		-
	Furosemid	2,09	1,48	-	-	-	-
8	EEBL 150 mg/kg BB	0,93	0,32	-1,17	-	-	-
	EEBL 300 mg/kg BB	1,50	0,89	-0,59	0,58	-	-
	EEBL 600 mg/kg BB	1,86	1,25	-0,23	0,93	0,36	-
	BNT $_{0,05}$ =	0,06		BNT $_{0,01}$ =	0,08		

Table 4.4 shows the results of the Least Significant Difference (LSD) test as follows:

1. At 6 hours, there was a significant difference in urine volume between the groups given the test material and those given CMC as a solvent and furosemide as a comparison.
2. At 7 hours, there was no difference between the groups given the 600 mg/kg body weight lamtoro seed ethanol extract and the group given furosemide as a comparison.
3. At 8 hours, there was a difference between the groups given the 150 mg/kg body weight lamtoro seed ethanol extract and the 300 mg/kg body weight lamtoro seed ethanol extract and the group given furosemide as a comparison.

Overall test results showed that at 6 hours, an increase in urine volume was observed in mice given furosemide and lamtoro seed ethanol extract. However, there was still no difference between CMC and the lamtoro seed ethanol extract at a dose of 150 mg/kg BW. Furthermore, at 7 hours, a difference was observed between CMC and the lamtoro seed ethanol extract at a dose of 150 mg/kg BW, indicating that at 6 hours, the lamtoro seed ethanol extract began to provide good effectiveness in increasing urine volume in mice.

The administration of lamtoro seed ethanol extract that provided the most effective increase in urine volume (diuretic) was the 600 mg/kg BW dose, as there was no significant difference at 8 hours compared to furosemide.

IV. CONCLUSION

Based on the research results, it can be concluded that fresh lamtoro seeds, simplicia contain alkaloids, saponins, flavonoids, tannins, fat proteins, calcium, phosphorus, iron, amino acids, and leucanol. Ethanol extract of lamtoro seeds has diuretic effectiveness in male white rats and ethanol extract of lamtoro seeds with a dose of 150mg/kg BW has shown diuretic effectiveness compared to solvent controls.

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