

Uji Efektivitas Ekstrak Etanol Daun Mengkudu (*Morinda citrifolia* L.) sebagai Agen Penurun Berat Badan pada Mencit (*Mus musculus*)

*Effectiveness Test of Ethanol Extract of Noni (*Morinda citrifolia* L.) Leaves as a Weight Loss Agent in Mice (*Mus musculus*)*

Faramita hiola¹/ Julianty akuba²/ Andini buta³

^{1,2,3}Department of Pharmacy, Faculty of Sports and Health, Universitas Negeri Gorontalo

✉ Corresponding author: faramita@ung.ac.id

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*Corresponding author

Faramita hiola, Departmen of Pharmacy, Faculty of Sports and Health, Universitas Negeri Gorontalo
E-Mail: faramita@ung.ac.id

Abstrak

Obesitas adalah suatu gangguan yang ditandai dengan penumpukan lemak berlebih di dalam tubuh, yang sering kali disebabkan oleh konsumsi makanan berlebihan. Individu yang mengalami obesitas memiliki risiko lebih tinggi untuk mengembangkan penyakit degeneratif. Salah satu tanaman yang diketahui dapat membantu mengurangi obesitas adalah mengkudu (*Morinda citrifolia* L.). Tanaman ini mengandung senyawa flavonoid yang berfungsi sebagai inhibitor lipase pankreas dan penekan nafsu makan, sehingga membantu menurunkan berat badan. Penelitian ini bertujuan untuk mengetahui efektivitas ekstrak etanol daun mengkudu (*Morinda citrifolia* L.) sebagai agen penurun berat badan pada mencit (*Mus musculus*). Penelitian ini menggunakan metode eksperimental. Uji efek anti-obesitas dilakukan pada mencit jantan yang dibagi menjadi lima kelompok perlakuan: Kelompok I sebagai Kontrol Negatif (Na CMC 1%), Kelompok II sebagai Kontrol Positif (Orlistat), Kelompok III sebagai Kelompok Uji 1 (Dosis 20 mg/kg BB), Kelompok IV sebagai Kelompok Uji 2 (Dosis 30 mg/kg BB), dan Kelompok V sebagai Kelompok Uji 3 (Dosis 40 mg/kg BB).

Hasil penelitian menunjukkan bahwa ekstrak etanol daun mengkudu (*Morinda citrifolia* L.) mengandung metabolit sekunder seperti flavonoid, saponin, dan tanin. Hasil juga menunjukkan bahwa efektivitas terbaik diperoleh pada kelompok dengan dosis 40 mg/kg BB, meskipun nilainya lebih tinggi dibandingkan kelompok kontrol positif (Orlistat 120 mg).

Kata Kunci: *Obesitas, Mengkudu (*Morinda citrifolia* L.), Etanol, Mencit (*Mus musculus*)*

Abstract

Obesity is a disorder characterized by excessive fat accumulation in the body, often caused by overconsumption of food. Obese individuals are at higher risk of developing degenerative diseases. One plant known to reduce obesity is Noni (*Morinda citrifolia* L.) plant. This plant contains flavonoid compounds that act as pancreatic lipase inhibitors and appetite suppressants, thus aiding in weight loss. This research aims to determine the effectiveness of ethanol extract of Noni (*Morinda citrifolia* L.) leaves as a weight loss agent in mice (*Mus musculus*). This research employs an experimental method. The anti-obesity effect test was conducted using male mice, divided into five treatment groups: Group I as the Negative Control Group (Na CMC 1%), Group II as the Positive Control Group (Orlistat), Group III as Test Group 1 (Dose 20 mg/kg BW), Group IV as Test Group 2 (Dose 30 mg/kg BW), and Group V as Test Group 3 (Dose 40 mg/kg BW). The results indicate that the ethanol extract of Noni (*Morinda citrifolia* L.) leaves contains secondary metabolites such as flavonoids, saponins, and tannins. The results indicate that the best effectiveness was observed in the group with a 40 mg/kg BW dose, though it was greater than the positive control group (Orlistat 120 mg).

Keywords: *Obesity, Noni (*Morinda citrifolia* L.), Ethanol, Mice (*Mus musculus*)*

BACKGROUND

Unbalanced lifestyles and diets in modern society contribute to the emergence of various diseases, one of which is obesity. According to the World Health Organization (2015), the increase in obesity rates is a significant global health issue. Each year, around 2.8 million adults die from being overweight or obese. Overall, more than 10%

of the world's adult population is obese, with nearly 300 million of them being women. In Indonesia, obesity rates continue to show an increasing trend year by year, with a prevalence reaching 15.3%, which increased to 21.8% based on 2018 data. Obesity, or overweight, is a condition where a person's weight exceeds normal levels, potentially leading to obesity. According to Pramudji (2018), obesity is the excessive accumulation of triacylglycerol in fat tissue due to excessive energy intake compared to the energy expended. Obesity is a multifactorial disease, largely caused by the interaction between genetic factors and environmental factors. With the increasing number of obesity sufferers, urgent action is required to address this issue. Several steps that can be taken to lose weight include diet therapy or calorie management, increasing physical activity, and using drugs that assist with weight loss. Currently, the use of treatments based on natural ingredients is increasingly becoming an alternative therapy that is developing and attracting public attention. The demand for herbal therapy arises from the belief that herbal medicines have fewer side effects compared to conventional medicines (Prasongko et al., 2020). One traditional plant believed to be effective for weight loss is noni (*Morinda citrifolia* L.). According to Mandukhail et al. (2010), Noni leaves (*Morinda citrifolia* L.) contain flavonoid compounds that are thought to reduce fat in the blood, thus potentially reducing body weight. The mechanism of flavonoids in weight reduction, according to Dzomba (2014), is that flavonoids act as antioxidants that work as pancreatic lipase inhibitors and reduce appetite. Pancreatic lipase is an enzyme that catalyzes the hydrolysis of triglycerides into free fatty acids and glycerol, which are absorbed by the body.

METHODS

Experimental Animal Models

The experimental animals used were BALB/c mice (body weight 20-30 g), which were obtained and maintained at the Animal Laboratory of the Pharmacy Department, Gorontalo State University. Twenty mice were adapted to their new environment for 7 days before testing. During the adaptation period, the mice were divided into five groups, each consisting of four mice. After 7 days of adaptation, the mice were weighed to determine their initial body weight. The mice were then induced to become obese orally by using high-fat feed for 7 consecutive days at a dosage of 5 g/kg body weight. The high-fat feed was chosen because it contains high levels of fat and calories, which can increase body weight. The mice were weighed again after being induced with the high-fat feed and were considered obese if their body weight exceeded 30 grams (Eduard, 2016).

Preparation of Ethanol Extract from Noni Leaves (*Morinda Citrifolia* L.) The crushed noni leaves (*Morinda Citrifolia* L.) were then extracted by maceration using a 70% ethanol solvent. The maceration process involved weighing 500 g of dried noni leaf simplicia and mixing it with 2000 mL of solvent until the sample was completely submerged. Maceration was carried out for three 24-hour periods, and after 3 days, the extract was filtered using filter paper. The filtrate was then evaporated until a thick extract was obtained. The percentage of immersion of the extract was then calculated (Herbal Pharmacopoeia, Indonesia, 2017).

Phytochemical Screening Test of Noni Leaf Extract (*Morinda Citrifolia* L.) The analysis of flavonoid compounds was performed by placing 1 gram of noni leaf extract into a test tube, followed by the addition of 2 mg of magnesium powder and 3 drops of concentrated HCl. The mixture was shaken, and the color changes that occurred were observed. The test was considered positive for flavonoids if the color changed to red, yellow, or orange (Ferna et al., 2019). The analysis of saponin compounds was carried out by extracting 1 gram of noni leaves into a test tube. Hot water was then added and the mixture was shaken. The test was considered positive for saponins if foam formed and did not disappear after adding 1 drop of 2 N HCl (Mohammad Zaky et al., 2021). The analysis of tannin compounds was conducted by extracting 1 gram of noni leaves into a test tube and adding several drops of 1% FeCl₃. The test was considered positive for tannins if a dark blue or greenish-black color formed (Marjoni, 2016).

Testing the Effectiveness of Ethanol Extract of Noni Leaves (*Morinda Citrifolia* L.) for Weight Loss in Mice (*Mus Musculus*)

Prior to the study, the research was reviewed and approved by the Health Research Ethics Committee of UNG, with approval number SK 057/UN47.B7/KE/2024. In this study, 20 male mice were used as test subjects and divided into five groups: the negative control group (Na-CMC 1%), the positive control group (Orlistat 120 mg), Group 1 (20 mg/kg BW extract), Group 2 (30 mg/kg BW extract), and Group 3 (40 mg/kg BW extract). Each group consisted of four mice. All groups had their body weight measured before being given the high-fat feed to determine the initial body weight, and all groups were given 5 grams of high-fat feed. Data analysis was conducted using data processing software to determine the effect of ethanol extract of noni leaves (*Morinda Citrifolia* L.) on weight loss in mice.

RESULTS

Extraction of Noni Leaves (*Morinda Citrifolia* L.)

Table 1. Yield Results of Ethanol Extract of Noni Leaves (*Morinda Citrifolia* L.)

Solvent	Solvent	Sample Weight (grams)	Extract Weight (grams)	Yield (100%)
	Volem (mL)			
Etanol	2000 mL	500 grams	72 grams	14,4%

Table 1 shows that by extracting a 500 gram sample of noni leaves (*Morinda Citrifolia L.*) using 2000 mL of 70% ethanol solvent, 72 grams of thick extract was obtained with a yield percentage of 14.4%. The yield results obtained are included in the range of good yield values, namely not less than 10% (Indonesian Herbal Pharmacopoeia, 2017).

Phytochemical Screening of Ethanol Extract of Noni Leaves (*Morinda Citrifolia L.*)

Table 2. Phytochemical Screening Results of Ethanol Extract of Noni Leaves (*Morinda Citrifolia L.*)

Phytochemical	Reagent Test	Result Noni leaves
Flavonoids	Magnesium and HCl	+
Tannin	FeCl ₃	+
Saponins	Warm Water and HCl	+

Table 2 shows the results of the phytochemical screening test for noni leaf extract (*Morinda Citrifolia L.*) which contains flavonoid, saponin and tannin compounds. The phytochemical screening method is carried out by looking at the color testing reaction using a color reagent.

Table 3. Data on body weight of mice after treatment

Day	Treatment Group				
	Negative Control	Positive Control	Test 1 20mg/kg BB	Test 2 30mg/kg BB	Test 3 40mg/kg BB
1	34 g	36 g	34 g	35 g	36 g
3	35 g	32 g	33 g	33 g	32 g
5	36 g	29 g	31 g	31 g	30 g
7	37 g	25 g	28 g	28 g	28 g

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