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Okra (*Abelmoschus esculentus* L Moench) as Anti-Cholesterolemia, Anti-Diabetic and Anti-Obesity in White Male Rats

Nur Rahayuningsih, Yedy Purwandi Sukmawan, Maritsa Nurfatwa*

Department of Pharmacy Institute of Health Science of Bakti Tunas Husada Tasikmalaya West Java, Indonesia

Abstract. Hypercholesterolemia is a cholesterol elevation condition in blood serum. Type 2 Diabetes Mellitus is a metabolic disorder which increases significantly in the whole world, associated with obesity and lipid accumulation in the body. *Abelmoschus esculentus* L Moench is used as an anti-obesity and hypercholesterolemia empirically.The objective of the study is to determine the anti-obesity anti-diabetic and anti-hypercholesterolemia effect of *Abelmoschus esculentus* L Moench ethanolic extract in animal high-fat diet model. We were conduct short-term and long-term test. The Blood sample was collected from all rats after 8 hours fasting previously. In short-term ($p = 0.000$) and long-term test ($p = 0.005$) showed significantly different between the negative and positive group. Dose III showed no significantly different than positive group ($p>0.05$) in the short-term test. While, Dose I, II and III showed no significantly different than the positive group to decrease triglyceride level in the long-term test. Dose III showed the best effect to decrease triglyceride level in blood serum and equivalent to the positive group.

Keywords : Okra, Anti-hypertriglyceridemia, Diabetic, Obesity

1 Introduction

Obesity is a chronic disorder which becomes a global pandemic and hard to control[1]. 39% (>18 y.o) peoples in the world are obese [2]. While, 15.5% Indonesia peoples are obese [3]. People who have obesity are at increased risk for many serious disease such as all cause of death, high blood pressure, dyslipidemia, type 2 diabetes mellitus, coronary heart disease, stroke, sleep apnea, osteoarthritis, mental illnes and some cancers [3;4]. Okra (*Abelmoschus esculentus* L Moench) is a tropical plant which uses empirical as a herbal medicines. Anti-obesity, anti-hypertriglyceridemia and anti-diabetic of this plant are still lack. Therefore, Anti-obesity, anti-hypertriglyceridemia, and anti-diabetic are necessary.

2. Methodology

Rotary evaporator, analytical scales (mettler toledo), centrifuge, photometer (intherma 168), okra fruit, ethanol 70%, orlistat, aquadest, gluco-dr, and dyasis cholesterol reagent.

2.1 Plant Preparation

Okra Fruits obtained from Agro Plantation, Jakarta. Plant identification and authentication were by the Herbarium of Padjadjaran University, Indonesia. The fruits washed in tap water, cut into pieces and reduced into a fine powder. The powder is macerated for 72 hours in ethanol (70% v/v) at room temperature and filtered with Whatman filter paper. The filtrate was subsequently concentrated using a rotary vacuum evaporator to obtain the solid extract.

2.2 Animals

White male rats were used. The animals purchase from animal laboratory Institut Teknologi Bandung and housed in the standard condition (Temperature 25^{O}C, Humidity 40-70%, 12 hours light/dark cycle) with ad libitum of water.

*Corresponding author: nur.rahayuridwan@gmail.com

2.3 Experimental Procedure

We divide eighteen animal in six groups consist of normal group, negative group (HFD), positive group (HFD and Orlistat), dose I group (HFD and Okra Extract Dose I), dose II group (HFD and Okra Extract Dose II) and dose III group (HFD and Okra Extract Dose III). High fat diet (HFD) consist 49% carbohydrate, 30% lipid (sheep fat), 18% protein (egg protein) and 3% oil. The testing conducted in short-term (2 weeks) and long-term (4 weeks) condition. One day the treatments are over, we conducted cholesterol, glucose, and body weight determination.

2.4 Analysis statistical

All data are present as the figure. Non parametric testing Kruskal-Wallis and Mann Whitney are used (SPSS 16.00).

3. Results and discussion

3.1 Results

Both simplicia and extract showed the same results of phytochemical screening contains an alkaloid, flavonoid, tannin, polyphenol, steroid, monoterpenoid and sesquiterpenoid.

Table 1. Phytochemical screening

No	Secondary Metabolite		
		Simplicia	Extract
1	Alkaloid	+	+
2	Saponin	-	-
3	Flavonoid	+	+
4	Tannin	+	+
5	Poliphenol	+	+
6	Triterpenoid	-	-
7	Steroid	+	+
8	Monoterpenoid sesquiterpenoid	+	+
9	Quinone	-	-

+ = Identified, - = Not Identified

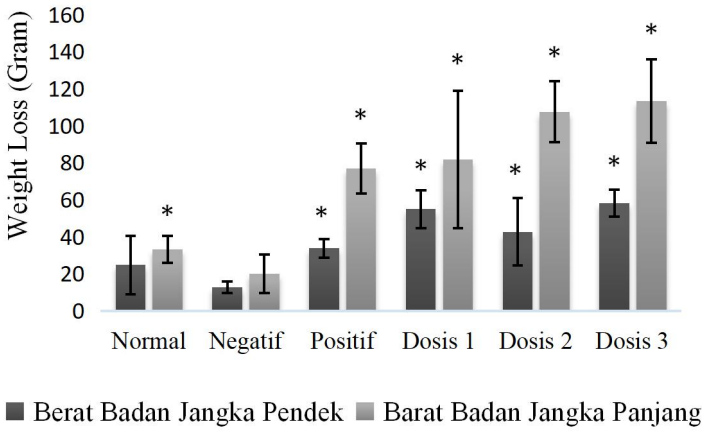

Fig. 1. Short-term and long-term body weight
*showed significant different ($p<0.05$) than negative group

Short-term and long-term testing showed the significant difference ($p<0.05$) in loss of the body weight for all dose group than the negative control group. In short-term body weight testing, dose I, II and III showed the significant difference ($p<0.05$) than the positive group in weight loss. While in Long-term body weight testing, dose II and III showed the significant difference ($p<0.05$) than the positive group in weight loss. In addition, there's a correlation between dose and activity which showed higher the dose, the higher the weight loss.

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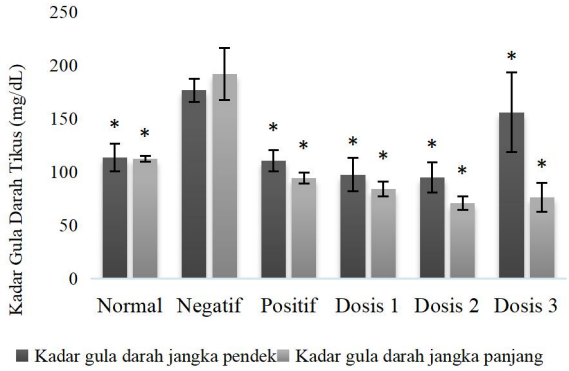

Fig. 2. Blood Glucose Concentration
*showed significant different ($p<0.05$) than negative group

Short-term and long-term testing showed significant difference ($p<0.05$) in blood glucose concentration for all dose group than the negative control group. Blood glucose elevation in negative group showed succesful of the induction. There's no correlation between dose and hypoglycemic activity. The dose II showed better hypoglycemic activity than positive, dose I and dose III group.

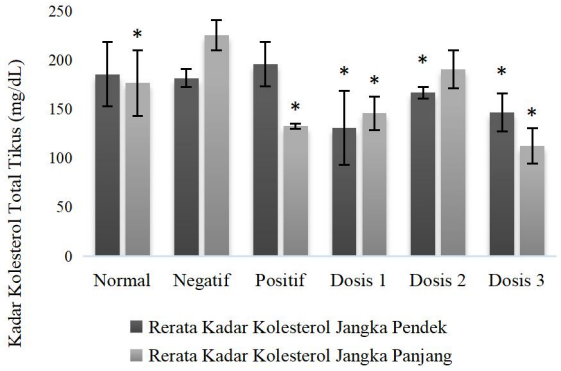

Fig. 3. Cholesterol Concentration
*showed significant different ($p<0.05$) than negative group

Short-term and long-term testing showed significant difference ($p<0.05$) in cholesterol concentration decrease for all dose group (except long term treatment in dose II) than the negative control group. There's no correlation between dose and anti-cholesterol activity. The dose III showed better hypoglycemic activity than positive, dose I and dose II group.

3.2 Discussion

Okra (*Abelmoschus esculentus* L Moench) ethanolic extract showed anti-obesity, anti-diabetic and anti-cholesterol activity. Anti-diabetic activity of okra accompanying with anti-obesity activity. This same feature also shown by antidiabetic drugs such as biguanide group, glucagon like-peptide 1 and sodium glucose transpoter-2 inhibitor. Therefore, the mechanism of action of okra may related of these antidiabetic drugs [6]. Obesity is related with diabetic and cholesterol. Obesity increase the risk of type 2 diabetes mellitus through induction of insulin resistance due of chronic and low grade inflammation [7]. Obesity also correlate with high LDL and low HDL level [8]. Okra showed absorption inhibition of the cholesterol in the intestinal [9]. The majority of these complication are related to comorbid conditions that include as all cause of death, high blood pressure, dyslipidemia, type 2 diabetes mellitus, coronary heart disease, stroke, sleep apnea, osteoarthritis, mental illness and some cancers [4,5]. Safety study of Okra showed no significant different with acarbose safety profile in mortality [9]. Therefore

*Corresponding author: nur.rahayuridwan@gmail.com

triple activity of Okra ethanolic extract with good safety profile prove the potential beneficial effects of Okra (*Abelmoschus esculentus* L Moench) and it's properties can be useful remedy to manage these disorders.

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*Corresponding author: nur.rahayuridwan@gmail.com