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The Effects of Ethanol Mahogany (*Sweitenia mahagoni* Jacq.) Seeds Extract on Antioxidant Superoxide Dismutase in the Liver Tissues of Diabetic Experimental Rats

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INTRODUCTION

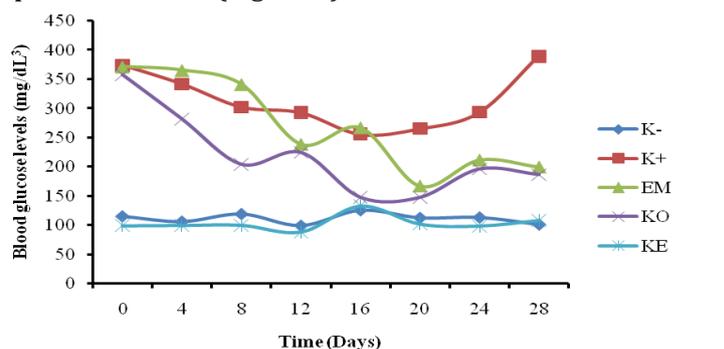
Diabetes mellitus (DM) is a metabolic disease that can be indicated with high level of blood glucose. The impairment metabolism of carbohydrate, protein, and lipid in DM caused by deficiency and resistance of insulin. The diabetic condition inducing production of reactive oxygen species-free radical. Increased levels of the reactive oxygen species create a situation known as oxidative stress. Antioxidant play an important role in protection of cell against oxidative stress and maintain a balance between the various toxic oxygen species. *Sweitenia mahagoni* Jacq. was reported to have hypoglycemic effect and inhibit the activity of α -glucosidase in diabetic experimental rats^{1,2}.

MATERIALS AND METHODS

This study used a total of 35 male *Rattus norvegicus* strain *Sprague Dawley* (SD). They were obtained from unit of animal laboratory management, Faculty of Veterinary Medicine, Bogor Agricultural University. The rats were divided into 5 groups: (i) negative control group (K-), (ii) positive control group/ DM (K+), (iii) DM group that treated with 500 mg/kgBW of the ethanol mahogany seeds extract (EM), (iv) DM group that was treated with acarbose (KO), and (v) non DM group that was treated with the ethanol mahogany seed extract (KE). Condition of DM (except K- and KE) was obtained by alloxan induction with dose 110 mg/kgBW. The treatments were done for 28 days. At the end of treatment, the rats were anesthetized with xylazine and ketamine. The liver tissues were then obtained and analyzed for (a) the content of malondialdehyde (MDA) using thiobarbiturate acid reactive substance (TBARS) method and (b) the content of antioxidant cooper zinc superoxide dismutase (Cu,Zn-SOD) using immunohistochemical technique.

RESULTS

The ethanol mahogany seeds extract showed decreased blood glucose levels in diabetic experimental rats (Figure 1).



◀ Figure 1. Blood glucose levels of treated rats. K- = negative control group (non DM), K+ = positive control group (DM); EM = DM + extract; KO = DM + acarbose; and KE = extract control group (non DM).

The treatment of ethanol mahogany seed extract decreased MDA level and increased the content of antioxidant Cu,Zn-SOD in the liver tissues of diabetic experimental rats. It showed the best results compared to that of other DM groups without the extract treatments (Table 1).

Table 1 The MDA level and number of hepatocyte in different degree of Cu,Zn- SOD content (per view of 10x magnification) in liver tissues of rats

Group	MDA Levels ($\mu\text{mol}/\text{gram}$)	The number of hepatocyte in different degree of Cu,Zn-SOD content			
		(+++)	(++)	(+)	(-)
K-	$0,81 \pm 0,17^a$	$50,2 \pm 5,56^a$	$132,2 \pm 41,54^a$	$151,7 \pm 16,91^a$	$63,7 \pm 20,83^a$
K+	$1,19 \pm 0,26^b$	$18,5 \pm 3,78^c$	$101,7 \pm 7,67^a$	$103,2 \pm 13,76^b$	$138,7 \pm 11,47^c$
EM	$1,10 \pm 0,04^{ab}$	$31,5 \pm 6,45^b$	$99,2 \pm 18,99^a$	$164,5 \pm 33,7^a$	$76 \pm 13,39^a$
KO	$0,95 \pm 0,13^{ab}$	$25,5 \pm 3,10^{bc}$	$101,5 \pm 24,56^a$	$135,2 \pm 33,65^{ab}$	$100 \pm 8,75^b$
KE	$0,92 \pm 0,01^{ab}$	$29,2 \pm 5,37^b$	$106,7 \pm 13,42^a$	$172,5 \pm 28,45^a$	$57,7 \pm 14,75^a$

K- = negative control group (non DM), K+ = positive control group (DM); EM = DM + extract; KO = DM + acarbose; and KE = extract control group (non DM). Strong positive (+++), moderate positive (++) , weak positive (+), and negative (-) reaction to the antioxidant dismutase superoxide

DISCUSSION

The ethanol mahogany seeds extract treatments showed decreased blood glucose and MDA level and increased the content of Cu,Zn-SOD in the liver tissues of diabetic experimental rats. These effects may caused by flavonoids, saponin, and triterpenoid that were reported found in the extract^{1,2}. It was reported that these bioactive compound scavenged superoxide anion and inhibit α -glucosidase activity^{1,3}. The hypoglycemic activity of ethanol mahogany seeds extract was also reported as an action mechanism by activating the gen responsive insulin². The study concluded that ethanol mahogany seeds extract decreased blood glucose levels and increased the antioxidant status in the liver tissues of diabetic experimental rats.

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