



## NANOHERBAL *OCIMUM BASILICUM* L REDUCE MDA AND INCREASE SOD LEVEL IN WISTAR RATS INDUCED STZ

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**Abstract:** One of the public health problems that is very serious and requires proper treatment for sufferers is diabetes mellitus (DM). An increase in plasma glucose levels that exceeds normal limits is one of the basics for diagnosing diabetes. This study aim to determine the antidiabetic activity of Nanoherbal Extract of *Ocimum Basilicum* L. This is an experimental study in which the research group was divided into seven groups, each including five rats weighing 200-250 grams. Which are (normal group, negative group, metformin, nanoherbal 25, 50, 100, and 200 mg/kgBW). Rats were induced by STZ 75 mg/kgBW + NCT 120 mg/kgBW until the blood glucose is above 200 mg/dL. The highest level of SOD is the control group  $63.984 \pm 2,065$  ng/mL and the lowest is negative group is  $22,41 \pm 2,06$  ng/mL. For group that given treatment show that the highest SOD level is in dose 200 mg/kgBW  $71,72 \pm 0,90$  ng/mL and the lowest is in dose 25 mg/kgBW  $31,814 \pm 1,11$  ng/mL and the group given metformin is  $68,52 \pm 32,39$  ng/mL. The highest level of MDA is in group control which given only STZ and NCT  $37,522 \pm 1,64$  ng/mL and the lowest MDA level is in normal group  $7.199 \pm 1,415$  ng/mL. however, after given extract show that MDA level decreases which show in the dosen 200 mg/kgBW  $7,76 \pm 1,64$  ng/mL that nearly to the value of normal MDA level while the highest in the treatment group is  $30,83 \pm 0,961$  ng/ml. In summary, Nanoherbal Extract of *Ocimum Basilicum* L has antidiabetic activity by increasing the level of insulin and antioxidant SOD level while reducing the MDA level

Keywords: Antidiabetic, *Ocimum Basilicum* L, SOD, MDA

## Introduction

One of the public health problems that is very serious and requires proper treatment for sufferers is diabetes mellitus (DM). An increase in plasma glucose levels that exceeds normal limits is one of the basics for diagnosing diabetes. The International of Diabetic Federation reports that there has been an increase in cases of diabetes mellitus in the world from 2013 to 2017. In 2013 there were 382 million cases, in 2015 there was an increase to 415 million cases and in 2017 there was also an increase in cases to 425 million cases. The global prevalence of DM sufferers in Southeast Asia in 2017 reached 8.5%. Based on the results of the 2018 Basic Health Research (Riskesmas) nationally, the prevalence of diabetes mellitus is 2.0%.

It is known that DM patients really need a treatment throughout their life which aims to reduce symptoms, prevent complications and also prevent a disease progression, while DM chemical drugs which are widely consumed by DM sufferers cause side effects in long-term use. so that we need a traditional medicine that is able to cure DM. These traditional medicines can be obtained from several plants in Indonesia, either from generation to generation or through compounds which are believed to be able to lower blood glucose levels so that they can be developed as anti-diabetic drugs.

For generations, people have used plants as anti-diabetic drugs. Treatment through plants began to increase so that many researchers tried to do research to overcome diabetes mellitus, including basil leaves. Through many studies, it is known that the results of standardization of basil leaf extract (*Ocimum Basilicum* L.) with organoleptic parameters are thick, dark green, distinctive odor, bitter while the secondary yield parameter is 6.08% and the remaining solvent = 0.99901 which has Flavonoids, Phenolic, apoin, teroid, Tanin and Terpenoid. Based on these studies, the researchers developed these results because it was known that basil leaf extract could be tested in lowering blood sugar levels in white rats so that these results are expected to be able to serve as an alternative medicine for people with diabetes mellitus.

This study aims to determine the antidiabetic activity of nanoherbal of *Ocimum Basilicum* L on Rat Induced Streptozotocin and Nicotinamide.

## Method

### Materials

The materials used in this study were carboxy methyl cellulose (Na CMC; Sigma, USA), ethanol 96% (Smart Lab, Indonesia), Phosphate buffer saline (PBS; Sigma, USA), cyclophosphamide (Cyclovid®; Novel, Indonesia), hydrochloric acid (Mallinckrodt, USA),

Mayer's reagent (Mitra kimia, Indonesia), Dragendorff (Mitra kimia, Indonesia), Bourchardat (Mitra kimia, Indonesia), Zn powder (Fisons Scientific Equipment, England), concentrated sulfuric acid (Mallinckrodt, USA), Molish reagent (Rofa Laboratorium Centre, Indonesia), iron(III) chloride reagent (Merck, Germany), Liebermann Burchat reagent (Mitra kimia, Indonesia), distilled water, and aquades.

### ***Animal***

Male Wistar rats weighing 150–200 grams were used and acclimated for 7 days with water ad libitum. The procedure was evaluated by Animal Research Ethics Committees (AREC), Universitas Prima Indonesia.

### ***Preparation of nanoherbal***

*Ocimum Basilicum* L were collected in Berastagi Indonesia's Northern Sumatera Province. In an Indonesian research institute, nanoherbal andaliman samples were created utilizing High-energy Milling (HEM) procedures with HCl 2M activator solution (Tokyo, Japan) (LIPI, Jakarta). They were washed and dried using HEM in compliance with the water content guidelines. Simplicia, a damaging material, was placed into a jar. The jar was subsequently filled with larger-diameter balls, little balls, and the final sample. The volume of the balls and samples combined did not surpass 2/3 of the jar's contents. It was tightly closed and filled with the ball and samples. After that, HEM was turned on for two hours. The size of nanoherbal andaliman was determined using the Particle Size Analyser (PSA) with ethyl alcohol as the diluent.

### ***Antidiabetic Activity Tes***

This is an experimental study in which the research group was divided into seven groups, each including five rats weighing 200-250 grams.

1. Control normal
2. Control negative STZ 75 mg/kgBW + NCT 120 mg/kgBW
3. Metformin 50 mg/kgBW + STZ 75 mg/kgBW + NCT 120 mg/kgBW
4. Nanoherbal 25 mg/kgBB + STZ 75 mg/kgBW + NCT 120 mg/kgBW
5. Nanoherbal 50 mg/kgBB + STZ 75 mg/kgBW + NCT 120 mg/kgBW
6. Nanoherbal 100 mg/kgBB + STZ 75 mg/kgBW + NCT 120 mg/kgBW
7. Nanoherbal 200 mg/kgBB + STZ 75 mg/kgBW + NCT 120 mg/kgBW

The induced mice were starved for 18 hours (drinking water was still provided) before receiving a 75 mg/kg bw intraperitoneal injection of streptozotocin solution. The rats' body weight and blood glucose levels were measured before they were induced to ascertain their initial body weight and blood glucose levels. The blood glucose levels of mice were examined on the third day to see if 200 mg/dl was deemed diabetes. The treatment began after the animals were diagnosed with diabetes; on the first day of treatment, blood glucose levels were checked every three days. On days 3, 5, 7, 9, 11, 13, and 14, the animal groups were tested for 14 days. Rats were sedated with ketamine 70 mg/kgBW after 14 days of therapy, then blood was drawn from the heart and centrifuged at 3000 rpm for 7 minutes. Supernatant area was obtained and SOD, MDA levels were analyzed.

## Result

### *SOD Level*

The results of SOD level can be seen in the table 1.

**Table 1.** The results of SOD level

Number	Group	Result (ng/mL)
1.	The control group	65,4 ± 2,12
2.	Control negative STZ 75 mg/kgBW + NCT 120 mg/kgBW	22,41 ± 2,06
3.	Metformin 50 mg/kgBW + STZ 75 mg/kgBW + NCT 120 mg/kgBW	68,52 ± 32,39
4.	Nanoherbal 25 mg/kgBB + STZ 75 mg/kgBW + NCT 120 mg/kgBW	31,814 ± 1,11
5.	Nanoherbal 50 mg/kgBB + STZ 75 mg/kgBW + NCT 120 mg/kgBW	42,175 ± 1,53
6.	Nanoherbal 100 mg/kgBB + STZ 75 mg/kgBW + NCT 120 mg/kgBW	62,14 ± 1,48
7.	Nanoherbal 200 mg/kgBB + STZ 75 mg/kgBW + NCT 120 mg/kgBW	71,72 ± 0,90

Table 1 shows that the highest level of SOD is the control group  $63.984 \pm 2,065$  ng/mL and the lowest is negative group is  $22,41 \pm 2,06$  ng/mL. For group that given treatment show that the highest SOD level is in dose 200 mg/kgBW  $71,72 \pm 0,90$  ng/mL and the lowest is in dose 25 mg/kgBW  $31,814 \pm 1,11$  ng/mL and the group given metformin is  $68,52 \pm 32,39$  ng/mL.

### MDA level

The results of MDA level can be seen in Table 3.

**Table 3.** The result of MDA level

Number	Group	Result (ng/mL)
1.	The control group	8,762 ± 2,53
2.	Control negative STZ 75 mg/kgBW + NCT 120 mg/kgBW	33,57 ± 2,06
3.	Metformin 50 mg/kgBW + STZ 75 mg/kgBW + NCT 120 mg/kgBW	8,799 ± 0,908
4.	Nanoherbal 25 mg/kgBB + STZ 75 mg/kgBW + NCT 120 mg/kgBW	29,14 ± 1,51
5.	Nanoherbal 50 mg/kgBB + STZ 75 mg/kgBW + NCT 120 mg/kgBW	27,49 ± 2,154
6.	Nanoherbal 100 mg/kgBB + STZ 75 mg/kgBW + NCT 120 mg/kgBW	19,722 ± 0,908
7.	Nanoherbal 200 mg/kgBB + STZ 75 mg/kgBW + NCT 120 mg/kgBW	8,799 ± 0,906

Table 3. show that the highest level of MDA is in group control which given only STZ and NCT  $37,522 \pm 1,64$  ng/mL and the lowest MDA level is in normal group  $7.199 \pm 1,415$  ng/mL. however, after given extract show that MDA level decreases which show in the dosen 200 mg/kgBW  $7,76 \pm 1,64$  ng/mL that nearly to the value of normal MDA level while the highest in the treatment group is  $30,83 \pm 0,961$  ng/ml.

### Discussion

Diabetes mellitus is a disease characterized by high blood glucose levels because the body cannot release or use insulin adequately. Blood glucose levels vary every day, blood sugar levels will increase after eating and return to normal within 2 hours. Normal blood glucose levels in the morning before eating or fasting is 70-110 mg/dL of blood. Normal blood sugar levels are usually less than 120-140 mg/dL 2 hours after eating or drinking liquids that contain sugar or carbohydrates.

DM is generally classified into two types, namely type 1 diabetes mellitus caused by heredity and type 2 diabetes mellitus caused by lifestyle. About 90-95% of all diabetic patients are people with type 2 diabetes. DM occurs when the insulin produced is not sufficient to maintain blood sugar at normal limits or if the body's cells are not able to respond appropriately so that

typical complaints such as polyuria, polydipsia, polyphagia will appear. , weight loss, weakness, tingling, blurred vision and erectile dysfunction in men and pruritus vulvae in women. A chronic condition occurs when blood glucose levels are above normal due to the pancreas not producing enough insulin or the body's ineffective use of the insulin it produces. To overcome blood glucose levels that are above normal, it can be used through the content contained in grapefruit leaves.

*Ocimum basilicum* L is one of the vegetables, better known as basil, originating from Africa, India, and Asia but is widely grown in various countries in the world. In classification, *Ocimum basilicum* L. is a species of the Lamiaceae family which is spread in various tropical areas, one of which is in Indonesia. These leaves have saponins, flavonoids, polyphenols, and many other compounds. In addition, this leaf also has many health properties to overcome several diseases. Alkaloids have effects in the health sector in the form of anti-hypertension and anti-diabetes mellitus. Tannins which function as  $\alpha$ -glucosidase inhibitors are useful for delaying the absorption of glucose after eating, thereby inhibiting postprandial hyperglycemia conditions. The  $\alpha$ -glucosidase enzymes include maltase, isomaltase, sucrase, lactase and  $\alpha$ -dextrinase. Carbohydrates will be digested by enzymes in the mouth and intestines into simpler sugars which will then be absorbed into the body and increase blood sugar levels. The process of digestion of carbohydrates causes the pancreas to release the enzyme  $\alpha$ -glucosidase into the intestine which will digest carbohydrates into oligosaccharides which will then be converted again into glucose by the enzyme  $\alpha$ -glucosidase released by the cells of the small intestine which will then be absorbed into the body. The  $\alpha$ -glucosidase enzyme hydrolyzes alpha ( $\alpha$ ) glycosidic bonds located between sugar residues. By inhibiting the action of the  $\alpha$ -glucosidase enzyme, it causes a decrease in monosaccharide absorption and a reduction in the postprandial increase in glucose. The flavonoids contained are thought to play a significant role in increasing the activity of antioxidant enzymes and being able to regenerate damaged pancreatic cells so that insulin deficiency can be overcome. The flavonoids contained in plants are thought to be able to improve the work of insulin receptors so that they have a beneficial effect on DM.

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