STUDY MECHANISM ANTIDIABETIC EXTRACT CEMBA LEAF (Acacia rugata (Lam.) Fawc. Rendle) THROUGH α-GLUCOSIDASE ENZYME INHIBITION

[1]ISHMIH NURUL R.U., [2]MUH. NUR ICHSAN, [3]ZAENAL JAFAR, [4]AKTSAR ROSKIANA AHMAD, [5]HERWIN

[1,2,3,4,5]Faculty of Pharmacy, Universitas Muslim Indonesia, Indonesia
Email: [1]ishmihnurul@gmail.com, [2]ichsannur970@yahoo.co.id, [3]zaenaljafar585@yahoo.com, [4]aktsar.roskiana@umi.ac.id,[5]herwin.farmasi@gmail.com

Abstract - Diabetes is the world's oldest diseases, diabetes is associated with the metabolism of glucose in the blood. Medically, the notion of diabetes mellitus aspect extends to a series of symptoms that arise in a person caused by an increase in blood sugar levels (hyperglycemia) due to lack of insulin. The development of diabetes mellitus treatment has been done, one of them is the use of natural materials and the development of traditional medicine that is more minimal side effects as antidiabetic drugs through the mechanism of inhibition of α-glucosidase enzyme and antioxidant (DPPH radical reduction). One of the local plants (endemic) that can be developed as an antidiabetic drug candidate is Cemba plants (Acacia rugata (Lam.) Fawc. Rendle).
Cemba (Acacia rugata (Lam.) Fawc. Rendle) one of the rare and endemic plants in South Sulawesi precisely in Enrekang. Community Enrekang leaves Cemba (Acacia rugata (Lam.) Fawc. Rendle) is used as an herb that is also believed to neutralize the fat from the meat so it does not cause hypertension and cholesterol, so that the potential of this plant is very large for the treatment of hypertension or hyperglycemia (diabetes mellitus), This research is expected to help determine the biological activity of methanol extract of leaves Cemba (Acacia rugata (Lam.) Fawc. Rendle) as an antidiabetic and the mechanism through inhibition of α-glucosidase enzymes and antioxidants.

Keywords - Acacia rugata (Lam.) Fawc. Rendle, Diabetes mellitus, enzyme α-glucosidase, DPPH, hyperglycemia.

I. INTRODUCTION

Diabetes is the world's oldest diseases, diabetes is associated with the metabolism of glucose in the blood. Medically, the notion of diabetes mellitus aspect extends to a series of symptoms that arise in a person caused by an increase in blood sugar levels (hyperglycemia) due to lack of insulin (Badawi, 2009). These disorders can occur due to damage pancreatic beta cells and is unable to supply The prevalence of diabetes mellitus according to the WHO (World Health Organization), Indonesia ranks fourth in the world (Badawi, 2009), and based on research results Wild et al. (2004) reported that in 2000, Indonesia ranks fourth after India, China and the United States with 8.4 million the number of people and is predicted to increase to 21.3 million in 2030. The underlying to provide special handling or bahakan seek alternative treatment for diabetes mellitus.

The development of diabetes mellitus treatment has been done, one of them is the use of natural materials and the development of traditional medicine that is more minimal side effects as antidiabetic drugs through the mechanism of inhibition of α-glucosidase enzyme and antioxidant (DPPH radical reduction). One of the local plants (endemic) that can be developed as an antidiabetic drug candidate is Cemba plants (Acacia rugata (Lam.) Fawc. Rendle). Cemba (Acacia rugata (Lam.) Fawc. Rendle) one of the rare and endemic plants in South Sulawesi precisely in Enrekang. Community Enrekang leaves Cemba (Acacia rugata (Lam.) Fawc. Rendle) is used as an herb that is also believed to neutralize the fat from the meat so it does not cause hypertension and jolesterol, so that the potential of this plant is very large for the treatment of hypertension or hyperglycemia (diabetes mellitus).

Research conducted by Ahmad et.al (2014) concerning the standardization of methanolic leaf extract cemba (Acacia rugata (Lam.) Fawc. Rendle) which refers to the Indonesian Herbal Pharmacopoeia (FHI) states that this plant meets the requirements as traditional medicine.

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II. EXPERIMENTAL DETAILS

2.1. Materials and Procedures

The tools used in this study are ala-glass tool, rotary evaporator, UV-Vis Spectrophotometer, micro pipette, vessel maceration, oven, incubator, sonicator, pH meter.
Materials research are simplicia leaves cemba

(Acacia rugata (Lam.) Fawc. Rendle), ethanol, methanol technically, the enzyme α-glucosidase, substrates, DPPH, plate TLC, quercetin, dimethyl sulfoxide, p-nitrophenyl α-D-glukopiranosida (PNP), sodium carbonate.

1. Sample Collection and Processing

Cemba leaves (Acacia rugata (Lam.) Fawc. Rendle) gathered in the village of Baraka Enrekang Salukanan Subdistrict. Samples were collected sorted wet, dried and powdered.

2. Extraction

Powder simplicia leaves cemba (Acacia rugata (Lam.) Fawc. Rendle) of 1000 mg was added to vessel maceration, add 2 liters of methanol technical, silenced and stirred occasionally for 3 days, filtered and the obtained liquid extract and in the evaporator to produce extracts of viscous , Remaseration process performed up to 3 times (DG POM, 2000).

3.Testing Inhibition of the enzyme α-glucosidase

Test the inhibitory effects of α-glucosidase performed on extracts cemba leaf methanol extract (Acacia rugata (Lam.) Fawc. Rendle) based on the procedure Saijyo et al. (2008) with some modifications.

a. Preparation of Extracts

Extract weighed as much as 2 mg and diluted with 200 mL of dimethyl sulfoxide (DMSO) to obtain a 1% concentration of the extract. Extract solution 1% in pipette 100 mL and added to 100 mL of dimethyl sulfoxide to obtain a 0.5% concentration of the extract thus obtained subsequent to the extract concentration of 0.25% and 0.125%.

b. Enzyme Preparation

Enzyme solution is prepared by dissolving 1.0 mg of α-glucosidase in 100 ml phosphate buffer pH 7 containing 200 mg of bovine serum albumin. Before being used as much as 1 mL of an enzyme solution was diluted 25 times with phosphate buffer at pH 7.

c. Testing Blank

Blank 5 mL of DMSO added with 495 mL of phosphate buffer at pH 7 and 250 mL of 20 mM p-nitrophenyl α-D-glukopiranosida (PNP), incubated for 5 min at 37 ° C. To the sample was added to 250 mL of an enzyme that has been diluted, the samples were incubated another 15 minutes at 37 ° C. After an incubation period is completed, written in 1000 mL of 200 mM Na¬2CO3. An absorbance of the sample was measured by UV-Vis spectrophotometer at a wavelength of 400 nm.

d. Sample Testing

Sample 5 mL of the extract solution coupled with 495 mL of phosphate buffer at pH 7 and 250 mL of 20 mM p-nitrophenyl α-D-glukopiranosida (PNP), incubated for 5 min at 37 ° C. To the sample was added to 250 mL of an enzyme that has been diluted, the samples were incubated another 15 minutes at 37 ° C. After an incubation period is completed, written in 1000 mL of 200 mM Na2CO3. An absorbance of the sample was measured by UV-Vis spectrophotometer at a wavelength of 400 nm.

e. Testing of Samples Without Enzyme

Sample 5 mL of the extract solution coupled with 495 mL of phosphate buffer at pH 7 and 250 mL of 20 mM p-nitrophenyl α-D-glukopiranosida (PNP), the samples were incubated for 5 min at 37 ° C. To the sample was added to 250 mL of phosphate buffer at pH 7 100 mM, the samples were incubated another 15 minutes at 37 ° C. After an incubation period is completed, written in 1000 mL of 200 mM Na¬2CO3. An absorbance of the sample was measured by UV-Vis spectrophotometer at a wavelength of 400 nm. As a positive control used extracts of koji. The reaction system can be seen in the following table.

f. Calculation of Percent Inhibition and IC50

% Inhibition is calculated using the formula:

$$\frac{\text{Blank Absorbance-Absorban Sample}}{\text{Blank Absorbance}} \text{x } 100\%$$

IC_{50}calculated using linear regression equations, sample concentration as the x-axis and% inhibition as the y-axis. From equation: y = a + bx values IC_{50} can be calculated using the formula:

$$IC_{50} = \frac{50 - a}{b}$$

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III. RESULTS AND DISCUSSION

Based on study, the result is :

Tabel 1.1 Resul of α-Glukosidase test

	Control	0.05	0.1	0.5	1
Absorbance	1.057	1.329	1.318	1.31	1.272
Absorbance Control	1.011	1.267	1.258	1.253	1.211

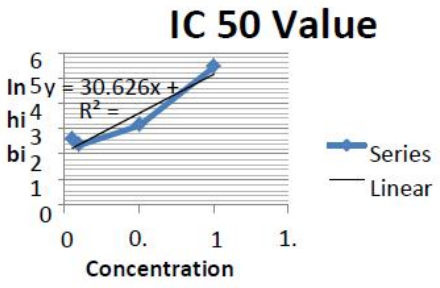
Tabel 1.2 % Inhibition and Value of IC50

Concentration (x)	% Inhibition (y)
0.05	25.81
0.1	23.33
0.5	31.34
1	54

Equation :

y =20.987+30.262x

IC50= 0.947µg/mL



CONCLUSION

Based on result of study, can be concluded that Cemba leaves (Acacia rugata (Lam.) Fawc. Rendle) has as an antidiabetic activity by value of IC50 0.947µg/mL.

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