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Antibacterium and Antioxidant Flavonoid from the Leaves of Mundu (Garcinia dulcis (Roxb) kurz)

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Abstract

Phytochemical screening showed that mundu (Garcinia dulcis (Roxb) kurz) leaves contain flavonoid. Extract of flavonoids were 12,40 g. Antioxidant test was carried out using the DPPH free radical capture method using UV-Visible spectroscopy at a maximum wavelength of 515 nm. Based on the linear regression obtained IC50 values for flavonoid coumpound were 25.02 mg/L. Antibacterium test was done by using agar diffusion method and antioxidant by using DPPH method on flavonoid compound .The activity of antibacteria of flavonoid compound on Staphylococcus aureus bacteria was 15.33 mm and Escherichia coli had inhibiting zone of 15.1 mm which could be categorized as a very strong antioxidant substance.
Keywords: Mundu Leaves Flavonoids, Antibacteria and Antioxidant

I. INTRODUCTION

Plants from the types of mangosteen (Garcinia) are commonly used as medicine. One of them is mundu (Garcinia dulcis). Based of phytochemical test, mundu is positively contains flavonoid compound. It is estimated that that 2% of the whole carbon which is photosyntized by the plant was changed to flavonoid or compound which was closely related to flavonoid [5]. The plant which contains flavonoid is usually used in traditional medication.

Flavonoid is a compound which contains C15 consists of two phenolate cores which is connected with three carbon units [6]. Flavonoid class can be described as compound column C_6-C_3-C_6 which indicates that its carbon consists of two C_6 clusters (substituted benzene rings) linked up by aliphatic chain of three carbons [7].. The result of the research conducted by [4] revealed that the result isolation and identification of unripe mundu extract (Garcinia dulcis) compound was morelloflavon.

Points out that the compounds of the isolation of fruit, flower, and kernel of G. dulcis have antibacterium activity on Staphylococcus aureus bacteria and MRSA (Methicilin Resistant Staphylococcus aureus) bacteria [2] , while report that santon compound obtained from root bark (Garcinia dulcis (Roxb) Kurz) has antibacterium activity toward Staphylococcus aureus and Eschericia colt [4]. Points out that mundu leaves contain flavonoid of biflavonoid group, but activity test of the flavonoid compound had not been done in that research [2].

Based on this explanation, it is necessary to do further study to find out the type of flavonoid compound found in mundu leaves by doing isolation and identification on mundu leaf extract, Flavonoid compound by doing antibacterium test on Staphylococcus aureus and Eschericia coli using agar diffusion method , and antioxidant test by catching DPPH free radicals (1.1 defenil-2-pikrillhidrazil) so that the benefit mundu plant for health can be explained scientifically to people.

II. MATERIALS AND METHODS

A. Materials and Solution Preparation

All the solvents and reagents used in this study were analytical grade and were used without further purification. 1,1- diphenyl-2-picrylhydrazyl (DPPH) was obtained from Sigma. Spectrophotometer UV-Vis is Varian Cary 100 Conc was used to measure λ max of antioxidant from sample.

B. Plant Material

The samples which were analyzed were mundu leaves as the result of isolation. The taxonomic identification of plant was conducted at the Herbarium Medanense, University of Sumatera Utara.

C. Phytochemical Screening Test on Mundu Leaf Extract

The refined, dried powder of mundu leaves was identified by performing photochemical screening done by preliminary test qualitatively with color reaction as follows: 10 grams of dried mundu leaf powder with 100 mL of ethyl acetate were put into an Erlenmeyer glass and left them in one night. After that, decantation was done and 2 mL of each sample of extract was divided into 3 reactive tubes and add then each per reaction.

D. Compound Purification as the Result of Isolation

Solidity obtained from the separation of column chromatography from the best fraction (61-81) was dissolved by methanol and KLT was analyzed by using some solvents with certain ratio. Chloroform: ethyl acetate of 80:20 (v/v) was mobile phase which indicated the best separation to be used for saturating preparative KLT vessel. The saturated solid matter was splattered slowly and homogenous along the lower edge of preparative KLT plate. The plate was put into a vessel containing the mixture of saturated solvent, and then it was covered. After the plate was taken out from the vessel, it was dried up, and the result was examined under the UV ray. Each zone was given a mark, scraped out, and stroked with chloroform: ethyl acetate (1:1). The result of the stroke was evaporated until yellow amorf solvent was obtained. The result of isolation was purified by using acetone solvent and n-heksan until pure compound was obtained which was proved by single spot in KLT plate.

E. Test of Flavonoid Compound Antibacterium Activity

1 ml of DPPH solution of 0.3 mM added with 2.5 ml of flavonoid compound as the result of isolation with the concentration of 10 ppm were made homogeneity in a reaction tube and left it within 30 minutes in a dark room. After that, absorbance was measured with maximum wave length of 516 nm. The same work procedure was done to test antioxidant and flavonoid compound as the result of isolation with the concentration of 25 ppm and 50 ppm

F. Test of Antioxidant and Flavonoid Compound Activity

1 ml of DPPH solution of 0.3 mM added with 2.5 ml of flavonoid compound as the result of isolation with the concentration of 10 ppm were made homogeneity in a reaction tube and left it within 30 minutes in a dark room. After that, absorbance was measured with maximum wave length of 516 nm. The same work procedure was done to test antioxidant and flavonoid compound as the result of isolation with the concentration of 25 ppm and 50 ppm.

III. RESULT AND DISCUSSION

A. Phytochemicals Screening

The result of sample determination done in Herbarium Medanense, University of Sumatera Utara, stated that the samples used in this research were correct. The powder of mundu leaves (Garcinia dulcis (Roxb)Kurz) was tested to find out whether the mundu leaves contain flavonoid compound or not. The test was done by using 5% of $FECl_3$ reactor, Mg powder, HC1(p), H_2SO_4 (p) reactor on the extract of ethyl acetate.

Table – 1
Preliminary test results on ethyl acetate extract of mundu leaves (Garcinia dulcis (Roxb) Kurz).

No	*Sample*	*Reactor*	*Result*
1.	*ethyl acetate extract*	*5% of $FeCl_3$*	+
2.	*ethyl acetate extract*	*Mg powder, HC1(p)*	+
3.	*ethyl acetate extract*	*H_2SO_4 (p)*	+

B. Antibacterium Test on Flavonoid Compound

In this method, bacterium activity toward the test samples was indicated by the establishment of inhibiting zone around disc paper which indicated the growth area of bacteria where flavonoid compound extract concentration was in the concentration of 0,25; 0,50 and 1,00 mg/ml. The following was the picture of bacterium activity test of positive gram bacteria and negative gram bacteria (Fig 1).

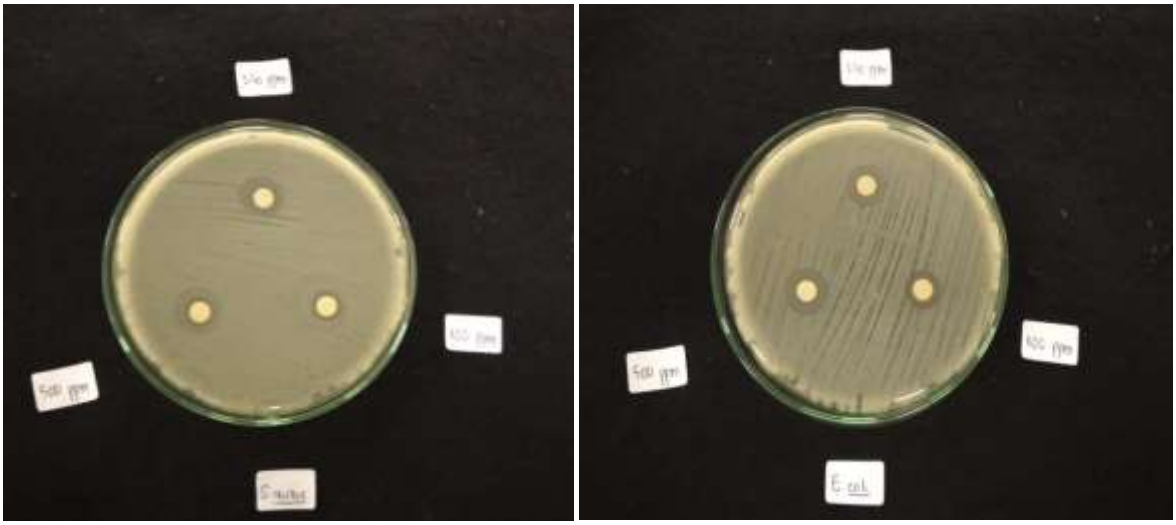

Fig. 1: Inhibiting Zone of Flavonoid Compound (Garcinia dulcis (Roxb Kurz) on bacteria a) S.aureus and (b) E.Coli with Extract Concentration of 0,25 mg/ml, 0,50 mg/ml and 1 mg/ml.

The result of the measurement showed that diameter of inhibiting zone in S. aureus bacteria was 14.1 ; 15,8 and 16,1 mm more than diameter of inhibiting zone in E. coli of 13.8 ; 15.6 and 15.9 mm. It could be said that DMSO extract of flavonoid compound with the concentration of 0.25; 0.50 and 1.0 mg/ml had the strong power of antibacteria. The inhibiting zone in the average E.coli bacteria was 15.1mm and the inhibiting zone of the average S. aureus bacteria was 15.33 mm.The following was Antibacteria chart of flavonoida compounds (Fig.2).

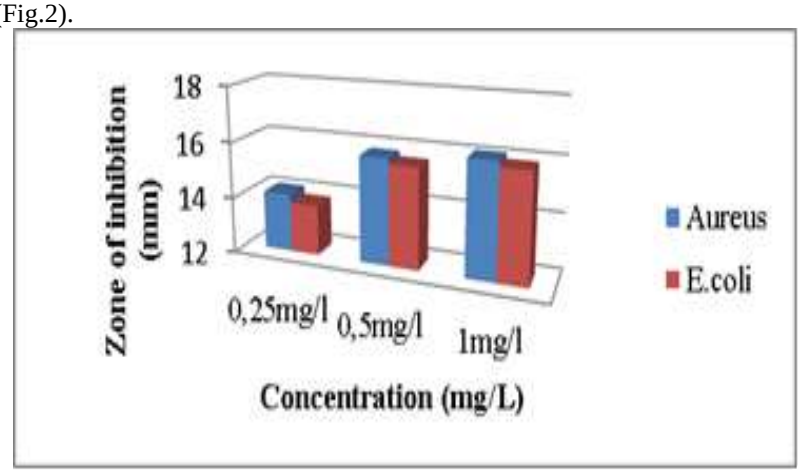

Fig. 2: Antibacteria of flavonoid compounds

This finding was supported by the criteria of antibacterium power according to [2] which was said that antimicrobial was resistant if inhibiting zone was < 12 mm; it was intermediate if inhibiting zone was 13-14 mm, and it was very powerful if inhibiting zone was > 15 mm. It was found that the factors which influenced the size of inhibiting zone were time, temperature, the number of the types of bacterium, pH, organic compound, and concentration [10]. Based on the data presented in the antibacterium graph of flavonoid compound, it was found that the higher the concentration was used, the wider the inhibiting zone. This was in accordance with the theory which said that the higher the concentration of an antibacterium substance was, the higher its antibacterium power [7]

C. *Test of antioxidant Activity Using 1.1difenil-2-Pikrilhidrazil(DPPH) Method*

The activity of flavonoid compound of mundu leaves (Garcinia dulcis (Roxb)Kurz) was tested by using catching free radical DPPH method by using UV-Visible spectroscopy which wave length was 515 nm. The calculation used was the value of IC_{50} (Inhibition Concentration of 50%) obtained from the result of linear regression equation.

Table – 2

Absorbance and % the percentage of absorber of flavonoid compound (%)of flavonoid from mundu leaves (Garcinia dulcis (Roxb)Kurz)

Concentration (mg/L)	*Absorbance*	*The percentage of absorber of flavonoid compound (%)*
Blank	*0,852*	-
10	*0,372*	*56,33 %*
25	*0,332*	*61,03 %*
50	*0,297*	*65,14 %*

The result of Table 2. indicated that the higher the concentration of a sample was, the higher the percentage of the absorber. Based on linear regression equation, it was found that the value of IC_{50} = 25.502 mg/L.

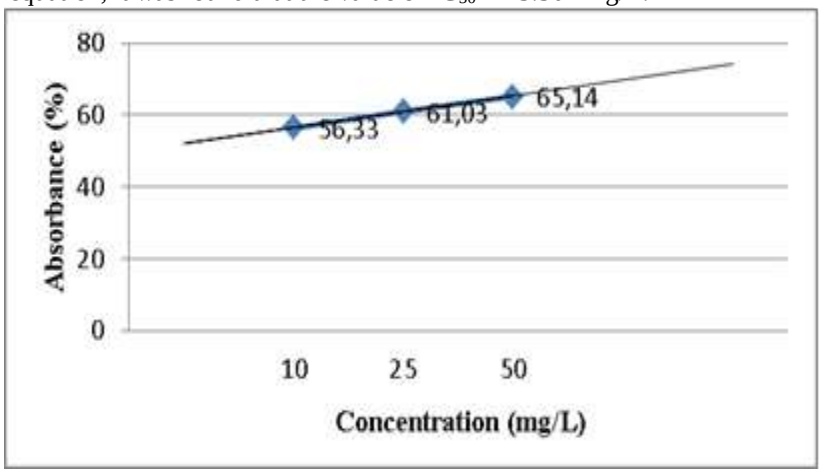

Fig. 3: Antioxidant chart of flavonoid compound

The IC_{50} value of the calculation of linear regression equation in which the concentration of regression equation and the percentage of absorber of flavonoid compound was y = 1.0347x + 23.638 R^2 = 0.5397. This equation was IC_{50} while coefficient x in this equation was the concentration of the extract which would be found its value in which the x value was the amount of concentration which would be needed to absorb 50% of DPPH radical activity.

The value of r = 0.5397 which indicated that by the increase in the extract concentration, its antioxidant activity would be greater.

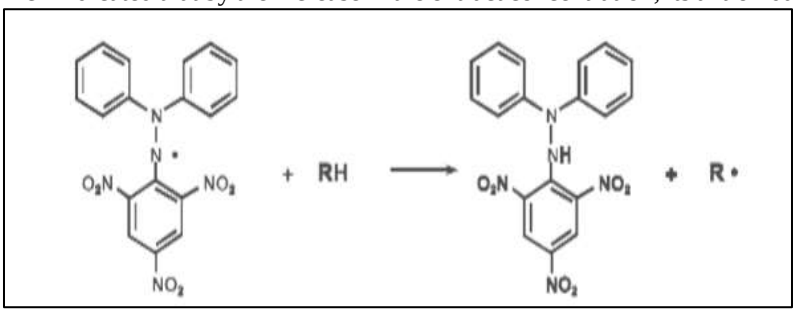

Fig. 4: Mechanism The reaction between DPPH and H atoms comes from Antioxidants.

IV. CONCLUSION

The screening results show that mundu leaves (Garcinia dulcis (Roxb)Kurz) contain flavonoid compound. Antibacterium activity obtained from flavonoid compound of mundu leaves was categorized as very strong with inhibiting zone in E.coli bacteria of 15.1 and inhibiting zone in S.aureus of 15.33. Meanwhile, antioxidant activity was obtained with the IC_{50} value of 25.02 mg/L which indicated that flavonoid compound of mundu leaves as the result of isolation was the strongest antioxidant.

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