Himpunan Kimia Indonesia

Persatuan Sains Analisis Malaysia

Universitas Sumatera Utara

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at

INTERNATIONAL SEMINAR OF ANALYTICAL SCIENCES 2012

THEME : ANALYTICAL SCIENCES FRONTIERS FOR CAPACITY BUILDING

on 12-13 November 2012 at Tiara Convention Center Medan - Indonesia

Medan, 13 November 2012

Main Committe,

Prof. Datuk Dr. Sukiman Sarmani
Main Chairman

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HIMPUNAN KIMIA INDONESIA • CABANG SUMATERA UTARA

Prof. Dr.Harry Agusnar, M.Sc
Chairman

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Dicetak di Medan, Indonesia

INTERNATIONAL OF SEMINAR ANALYTICAL SCIENCES (SKAM25)

CHAIRMAN

Praise be to Almighty Allah that the International Seminar of Analytical Sciences 2012 has been successfully proceeded. Skam 25 will also be known as International Seminar of Analytical Siences with the theme Analytical Sciences Frontier for Capacity Building. The Seminar is organized by Indonesia Chemical Society (HKI) Sumatera Utara Branch, Universitas Sumatera Utara with Analis Malaysia and University Kebangsaan Malaysia. This event brings together scientist, researcher, academics and industry to discuss the latest development and findings analytical sciences.

Our herties apparenciation to Deputy of Minester Defense, Governoor Sumatera Utara, Rector universitas Sumatera Utara, Naib Cancellor University Kebangsaan Malaysia and Sponsor Bank SUMUT, Orbiting Scientific and other collabortion partner which have been working together to make this event well organized.

Finally, we hope result of seminar have real contribution to development of chemistry. Hope fully you enjoy and get much benefit from this seminar.

Medan, 11 November 2012

Kindly Regards

Prof. Dr. Harry Agusnar, M.Sc

Chairman

CHAIRMAN

Dear collegues,
Welcome aboard!

The SKAM25 has been organized to provide a platform for the academicians and researchers to assemble and share the recent knowledge as well as to discuss the initiations required for the growing field of Analytical Sciences. Response to this conference is overwhelming. The conference will have total of 163 papers comprising two plenary, 4 keynotes, 96 orals and 61 posters.

Many thanks to Universiti Kebangsaan Malaysia (UKM), Persatuan Sains Analisis Malaysia (ANALIS), Universitas Sumatera Utara (USU) and Himpunan Kimia Indonesia (HKI) for organized this wonderful event. On behalf of the organizing committee, I thank our Patron, the Vice-Chancellor of UKM, Prof Tan Sri Dato' Dr Sharifah Hapsah Syed Hasan Shahabudin. I am also thankful to co-chairs of this conference, Assoc. Prof. Dr. Zaini Hamzah from Persatuan Sains Analisis Malaysia, Dr. Muhammad A. Martoprawiro from Himpunan Kimia Indonesia, Prof. Dr. Harry Agusnar from Univereitas Sumatera Utara and their colleagues for their invaluable support. Also, many thanks for them who supported us financially by giving advertisements in the conference digest.

My team, the organizing committee of the SKAM25, has been working relentlessly from the conference call to the registration desk to make the SKAM25 a memorable event. There were passionate and those services are beyond comparison. I acknowledge them with deep sense of gratitude and love.
I wish you a fruitful stay at SKAM25! Once again, I thank you, on the behalf of the organizing committee for your participation and support.

Best Regards,

PROF. DATUK DR. SUKIMAN SARMANI
University Kebangsaan Malaysia

RECTOR OF SUMATERA UTARA UNIVERSITY

Assalamulaikum Warahmatullahi Wabarakatuh.
Very Good Morning Ladies and Gentlemen.

First of all I would Jike to welcome to our Distinguished Guests and Keynote Speakers, as well as Presenters and Participans of The International Seminar of Analytical Siciences 2012 (IASC) which is jointly organised by: The Indonesian Chemical Society North Sumatra Symposium Chemical Analytical Science Malaysia (SCAM) held in Tiara Convention Centre, Medan, Indonesia On behalf of The Organising Committee and Civitas Academica of The University of Sumatra Utara, I would like to welcome you all to Medan and North Sumatra province. Especially to our Guests and Speakers coming from Malaysia and other Countries and Provinces in Indonesia, we do hope that you enjoy your stay during the Scientific Session in The IASC.

We are honoured to have you all here and would like to thank you to your interest and participation In The IASC to discuss our main issue we are facing today, especially in North Sumatra Province, regarding "Analytical Sciences Frontier for Capacity Building"

This issue is directly related nto the development of our economy and enterprises which have been subseptible to global crisis, due to their commodity-oriented products. Various agricultural and plantation products. Various agricultural and plantation products, especially in Sumatra island and Indonesia in General, such as: palm oil, natural rubber, wood, biomass, and other natural resources have not been processed to end products nd only been exported as commodities. Whereas several synthetic consumer product s, including: foods, medicines, as well as polymeric and other engineering materials have to be imported to fulfill domestic demands. Processing of the renewable natural resources requires chemistry as well as polymer material expertise ti increase value-added of the products, which inturn minimasing subseptibility of our economy against the global crisis.

In this occation we would like to thank to Keynote Speakers and Lectures: Particularly The Goveraur of North Sumatra For your invaluable contributions and recommendations in this seminar. We also thank to All Presenters and Participants for your interest and discussions.

Secondly, I would like to congratulate The Organisers of The Indonesian Chemical Society (ICS) and The SKAM. Hopefully, the ICS and the SKAM will gather all professionals and practitioners in the field of chemistry to contribute to the developments of North Sumatra Province and Malaysia-Indonesia in general.

Assalamulaikum Warahmatullahi Wabarakatuh.
Medan, 12th November 2012

Prof.Dr.dr. Syahril Pasarib, DTM&H,M.Sc(CTM),Sp.A(K)
Rector of The University of Sumatra Utara

LIST CONTENT

ORAL PRESENTER

POSTER PRESENTER

INHIBITION OF α-GLUCOSIDASE FOR WATER EXTRACT OF RARU (*Vatica pauciflora* Blume)

[1]Ida Duma Riris, [2]Tonel Barus, [3]Wiwi Winarti and [4]Partomuan Simanjuntak

[1]Faculty of Mathematics and Natural Sciences, Medan University
Jalan Willem Iskandar Medan, Indonesia; Email : riris@g.mail.com ; [2]Faculty of Mathematics and Natural Sciences, Sumatera Utara University, Jalan Bioteknologi, Medan Indonesia; [3]Faculty of Pharmacy, Pancasila University,Srengseng Sawah Jagakarsa, Jakarta, Indonesia; [4]Research Center for Biotechnology,Indonesian Institute of Sciences (LIPI), Jalan Raya Bogor KM 46, Cibinong, Indonesia

ABSTRACT

This study is aimed to determine antidiabetic activity based on α-glucosidase inhibition to some water extracts of the parts of Raru (*Vatica pauciflora* Blume). Results showed that α-glucosidase inhibition activity of bark extract (IC_{50} 13.53 ppm) was higher than those of other extracts (leaves and roots exhibited IC_{50} 16.96 ppm and 41.91 ppm respectively). While IC_{50} for acarbose compound (positive control) is 10.51 ppm. The chemical compound groups observed in the water extract of barks are tannin gallate, tannin catecuate, saponine and triterpenoids.

Keywords : water extract of Raru, α-glucosidase, *Vatica pauciflora*, antidiabetic

INTRODUCTION

Traditional medication using medicinal plants had been applied practically since ancient times by Indonesian people especially who lived on hinterland, for instance the usage of traditional medicine prepared by boiling or scalding it with water. Indonesia is rich with potential enormous biodiversity to be developed as medicines or raw materials for drug discovery. These facts demonstrate the important role and huge potency of natural products in drug discovery and development.

People's tendencies to "back to nature" bring changes in drug's consumption pattern from chemical base drugs to natural base drugs known as herbals. According to World Health Organization (WHO), approximately 80 % of world population uses traditional medicine from plant's extract in their health care. Increased demand on herbals has opened big opportunity for Indonesia to develop medicinal plant cultivation and large scale herbals manufacturing industries.

Indonesia's natural potencies are very supporting to natural base drugs (herbal products) development. One of the medicinal plants with potency as drugs material is Raru (*Vatica pauciflora* Blume). Traditionally, this plant is used by people in Tapanuli Utara area to lower blood sugar level or to treat *diabetes mellitus* (Pasaribu, 2011). This study is aimed to identify antidiabetic activity for water extracts of roots, barks, and leaves of Raru (*Vatica pauciflora* Blume) and to determine the antidiabetic chemical compound found in the water extract of the plant.

METHODS

Preparation of Water Extract

Each of sliced roots, barks, and leaves part of Raru (*Vatica pauciflora*) (100 grams) were subjected to reflux extraction at 60 °C-70 °C for 3 hours using 500 ml water with 3 repetitions. Water extracts were filtered at hot condition then concentrated by freeze drying method to obtain dry water extract.

Determination of Antidiabetic Test

The α-glucosidase enzyme activity inhibition test for water extracts of roots, barks, and leaves of Raru (*Vatica pauciflora*) were carried out based on modified method of Anand (2011) and Farnsworth (2007).

Preparation of Phosphate Buffer Solution pH 7.0

An amount of 27.22 grams potassium phosphate monobase P was dissolved in water and diluted with water until 1000 ml. The solution was transferred into 200 ml measuring vessel using pipette followed by adding 29.1 ml of 0.2 N sodium hydroxide. Water was then added until they reached vessel's mark. The solution was adjusted to pH 7.0.

Preparation of 0.2 M *p*-nitrophenyl-α-D-glucopyranoside Solution

An amount of 150 mg *p*-nitrophenyl-α-D-glucopyranoside was dissolved in 25 ml of phosphate buffer solution pH 7.0.

4 Conclusion

Blending between RBDPST and RBDPKL with ratio 60%:40% and followed by the interesterification reaction produce zero trans coating fat, is good and safe for health. Blending Palm Stearin and Palm Kernel Olein leads to new coating fat, offering cheaper alternatif with good physical and chemical properties. The properties like IV, MP, SFC, FACand TFA for the blends and interesterification were found to be a good coating fat with zero trans fat. Most spreads contain blends of two or more oils to combine desirable nutritional and essential physical properties. Interesterification is usually carried out on oil blends. Oils are also blended to obtain the desired mixture at minimum cost and computer programs to give the best solution have been developed.

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Preparation of Enzyme Solution

An amount of 1.0 mg α-glucosidase enzyme was dissolved in 100 ml phosphate buffer solution pH 7.0 containing 200 mg albumin bovine serum. One mL of this solution was transferred into vessel and diluted with 10 ml phosphate buffer solution pH 7.0.

Preparation of Sample Solution

1. Main Sample Solution
   Each of water extract samples (50 mg) from roots, barks, and leaves of Raru (*Vatica pauciflora*) was dissolved in 5.0 ml dimethylsulphonate (DMSO) until the concentration reaches 10.000 ppm of main sample solution.
2. Serial Sample Solution
   Serial sample solutions were made in 5 different concentrations. From main sample solution, we transferred 30 µl, 60 µl, 90 µl, 120 µl, and 150 µl into 5 different vessels then added with DMSO until reached 1000 µl final volume. The final concentration of these serial sample solutions were 300 ppm, 600 ppm, 900 ppm, 1200 ppm, and 1500 ppm.
3. Tested Sample Solution
   - Sample Solution with Enzyme
     25 µl of each serial sample solutions were transferred into vessels using pipette. The solutions were added with 495 µl phosphate buffer solution pH 7.0 and 250 µl *p*-nitrophenyl-α-D-glucopyranoside 0.2 M. These mixtures were pre-incubated for 5 minutes at 37 °C. After 5 minutes 250 µl enzyme solution were added. The mixtures were incubated further for 15 minutes at 37 °C. After incubation, the reaction was stopped by adding 1000 µl sodium carbonate solution 0.2 M. The amounts of released *p*-nitrophenol were measured using UV-Vis Spectrophotometer at λ 400 nm.
   - Sample Solution without Enzyme
     25 µl of each serial sample solutions were transferred into vessels using pipette. The solutions were added with 495 µl phosphate buffer solution pH 7.0 and 250 µl *p*-nitrophenyl-α-D-glucopyranoside 0.2 M. These mixtures were pre-incubated for 5 minutes at 37 °C. After 5 minutes 250 µl phosphate buffer solution pH 7.0 were added. The mixtures were incubated further for 15 minutes at 37 °C. After incubation, the reaction was stopped by adding 1000 µl sodium carbonate solution 0.2 M. The amounts of released *p*-nitrophenol were measured using UV-Vis Spectrophotometer at λ 400 nm.

Preparation of Standard Solution (Acarbose)

1. Standard Main Solution
   Acarbose (50 mg) was dissolved in 5.0 ml of dimethylsulphonate (DMSO) solution.
2. Serial Standard Solution
   Serial standard solutions were made in 5 different concentrations. From main standard solution, we transferred 30 µl, 60 µl, 90 µl, 120 µl, and 150 µl into 5 different vessels then added with DMSO until reached 1000 µl final volume. The final concentrations of these serial standard solutions were 300 ppm, 600 ppm, 900 ppm, 1200 ppm, and 1500 ppm.
3. Standard Solution
   - Standard Solution with Enzyme
     25 µl of each serial standard solutions were transferred into vessels using pipette. The solutions were added with 495 µl phosphate buffer solution pH 7.0 and 250 µl *p*-nitrophenyl-α-D-glucopyranoside 0.2 M. These mixtures were pre-incubated for 5 minutes at 37 °C. After 5 minutes, 250 µl enzyme solution was added. The mixtures were incubated further for 15 minutes at 37 °C. After incubation, the reaction was stopped by adding 1000 µl sodium carbonate solution 0.2 M. The amounts of released *p*-nitrophenol were measured using UV-Vis Spectrophotometer at λ 400 nm.
   - Standard Solution without Enzyme
     Twenty-five µl of each serial standard solutions were transferred into vessels using pipette. The solutions were added with 495 µl phosphate buffer solution pH 7.0 and 250 µl *p*-nitrophenyl-α-D-glucopyranoside 0.2 M. These mixtures were pre-incubated for 5 minutes at 37 °C. After 5 minutes 250 µl phosphate buffer solution pH 7.0 was added. The mixtures were incubated further for 15 minutes at 37 °C. After incubation, the reaction was stopped by adding 1000 µl sodium carbonate solution 0.2 M. The amounts of *p*-nitrophenol released were measured using UV-Vis Spectrophotometer at λ 400 nm.
4. Control Positive Solution
   25 µl of DMSO were transferred into vessels using pipette. The solution was added with 495 µl phosphate buffer solution pH 7.0 and 250 µl *p*-nitrophenyl-α-D-glucopyranoside 0.2 M. These mixtures were pre-incubated for 5 minutes at 37 °C. After 5 minutes, 250 µl enzymatic solution were added. The mixtures were incubated further for 15 minutes at 37 °C. After incubation, the reaction was stopped by adding 1000 µl

sodium carbonate solution 0.2 M. The amounts of released *p*-nitrophenol were measured using UV-Vis Spectrophotometer at λ 400 nm.

5. Blank Solution
   25 µl of DMSO were transferred into vessels using pipette. The solution was added with 495 µl phosphate buffer solution pH 7.0 and 250 µl *p*-nitrophenyl-α-D-glucopyranoside 0.2 M. This mixture solution was pre-incubated for 5 minutes at 37 °C. After 5 minutes, 250 µl phosphate buffer solution pH 7.0 were added. The mixtures were incubated further for 15 minutes at 37 °C. After incubation, the reaction was stopped by adding 1000 µl sodium carbonate solution 0.2 M. The amounts of released *p*-nitrophenol were measured using UV-Vis Spectrophotometer at λ 400 nm.

Data Analysis of Antidiabetic Activity Test

Antidiabetic activity test analysis was performed in water extracts of roots, barks, and leaves of Raru. Absorbance of blank, positive control, and sample solutions from UV-Vis spectrophotometer were recorded. Inhibition percentage for each data were found using this formula:

$$\text{Inhibition (\%)} = \frac{C-S}{C} \times 100\ \%$$

Where C = Control absorbance (*p*-nitrophenol absorbance as a result of enzyme activity without sample)
S = $S_1 - S_0$
S_1 = *p*-nitrophenol absorbance as a result of enzyme activity with sample
S_0 = *p*-nitrophenol absorbance as a result of enzyme activity without sample

IC_{50} value was calculated based on linier regression of correlation between concentration and inhibition percentage.

Identification of chemical compound group was done using Farnsworth (1966) method.

RESULTS AND DISCUSSION

Extract Production

Extraction results for roots, barks, and leaves of Raru with reflux method using water as eluent were shown in Table 1.

Table 1. The results of Water Extract Production for roots, barks, and leaves of Raru

PARTS	AMOUNT USED (gram)	NATIVE DER	RENDEMEN (% w/w)
Roots	100.28	10.36	9.62
Barks	100.15	5.07	19.72
Leaves	100.20	4.10	24.39

Determination of α-glucosidase Inhibition Activity

Tests were carried out using acarbose as standard and water extracts of roots, barks, and leaves of Raru as test samples. Inhibition test for α-glucosidase used *p*-nitrophenyl-α-D-glucopyranoside as substrate. The results were shown in Table 2.

Table 2. The result of α-glucosidase inhibition activity test

NO.	INHIBITOR	IC_{50} VALUE
1	Acarbose	10.51
2	Water extract of Raru roots	41.91
3	Water extract of Raru barks	13.53
4	Water extract of Raru leaves	16.96

The test results indicated antihyperglicemic activity of the extracts. The α-glucosidase enzyme hydrolyzed *p*-nitrophenyl-α-D-glucopyranoside to glucose and *p*-nitrophenol which gave yellow color. The α-glucosidase inhibition activity of extracts was determined by *p*-nitrophenol formed and measured with UV-Vis Spectrophotometer (Hitachi U-3900) at length wave 400 nm.

IC_{50} value demonstrates the extract concentration (ppm) capable of inhibiting 50 % activity of α-glucosidase enzyme. According to Reddy, *et. al.* (27), a compound is considered active if it shows IC_{50} value less than 50 ppm, thus it has good potency as α-glucosidase enzyme inhibitor. Based on the results, water extract of Raru barks

showed highest inhibition activity amongst other extracts. IC_{50} value for water extract of barks (13.53 ppm) > IC_{50} value for water extract of leaves (16.96 ppm) > IC_{50} value for water extract of roots (41.91 ppm) with acarbose as positive control which has IC_{50} value 10.51 ppm. Highest IC_{50} value reached by water extract of Raru barks was presumably due to flavonoids, saponins, tannin gallate, tannin catecuate, and triterpenoids compounds contained in this plant's part that gave positive reactions.

Identification of Chemical Compound Group

Identification of chemical compound group or phytochemical screening was performed according to Farnsworth (15) method. The results were shown on Table 3.

Table 3. The results of chemical compound identification

NO	PHYTOCHEMICAL SCREENING	WATER EXTRACT		
		ROOTS	BARKS	LEAVES
1	Alkaloid	-	-	-
2	Flavonoid	+	+++	++
3	Saponin	-	+++	++
4	Quinone	-	-	-
5	Tannin gallate/catecuate	+/+	+++/+++	++/++
6	Steroid/Triterpenoid	-/-	-/++	-/-
7	Coumarin	-	-	-
8	Essential Oils	-	-	-

Legends :
- \- Negative
- \+ Positive
- ++ Strongly positive
- +++ Very strongly positive

Identification results showed that root simplisia of Raru contains flavonoids, tannin gallate, tannin catecuate, and triterpenoids compounds. Bark simplisia contains flavonoids, saponins, tannin gallate, tannin catecuate, and triterpenoids compounds, while leaves simplisia contain flavonoids, saponins, tannin gallate, tannin catecuate, and triterpenoids compounds. Water extract of roots contains flavonoids, tannin gallate, and tannin catecuate compounds. Water extract of barks contains flavonoids, saponin, tannin gallate, tannin catecuate, and triterpenoids compounds, while water extract of leaves contains flavonoids, saponins, tannin gallate, and tannin catecuate compounds.

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