

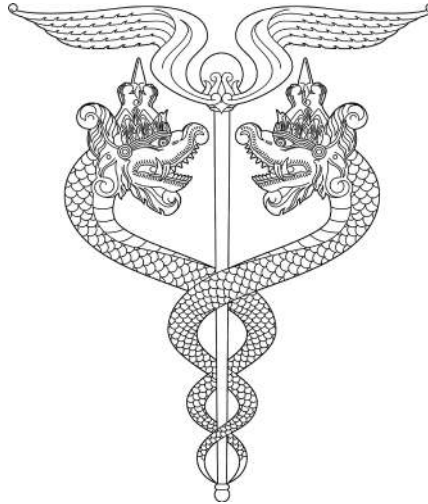
The Indonesian BIOMEDICAL JOURNAL

REVIEW ARTICLES

Chronodisruption and Obesity
Meiliana A, Dewi NM, Wijaya A
p.117-28

Adipose Tissue, Inflammation (Meta-
inflammation) and Obesity Management
Meiliana A, Dewi NM, Wijaya A
p.129-46

Propofol Effect on Stress Response and
Free Radicals in Patient during Surgery and
Sedation Procedure
Rahardjo TM
p.147-52



RESEARCH ARTICLES

Isolation of Mesenchymal Stem Cells from
Adipose Tissue
*Harsan, Mariya S, Sajuti D, Islam AA, Wahjoepramono
EJ, Yusuf I*
p.153-6

Free Radical Scavenging and α - β -
glucosidase Inhibitory Activities of Rambutan
(*Nephelium lappaceum L.*) Peel Extract
*Widowati W, Maesaroh, Fauziah N, Erawijantari PP,
Sandra F*
p.157-62

Dynamics of Interleukin-10 Levels in
Chronic Rhinosinusitis with/without Allergy
Punagi AQ, Rahardjo SP
p.163-6

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The Indonesian BIOMEDICAL JOURNAL

Volume 7 Number 3, December 2015

MISSION & VISION

The Indonesian Biomedical Journal mission is to assist, enlighten and support all health related policies by delivering information with speed. Its mission is represented by the Logo which is based on two main elements: the Caduceus Staff and naga Antaboga, which are prominent figures in Indonesian "wayang", specifically in the famous Mahabharata tale.

AIMS & SCOPE

The Indonesian Biomedical Journal is an open access, peer-reviewed journal that encompasses all fundamental and molecular aspects of basic medical sciences, emphasizing on providing the molecular studies of biomedical problems and molecular mechanisms.

The Indonesian Biomedical Journal is dedicated to publish original research and review articles covering all aspects in biomedical sciences. The editors will carefully select manuscript to present only the most recent findings in basic and clinical sciences. All professionals concerned with biomedical issues will find this journal a most valuable update to keep them abreast of the latest scientific development.

THE LOGO

The 'Indonesian Biomedical Journal' insignia is designed based on two main elements; the Caduceus staff and Naga Antaboga, which are prominent figures in Indonesian 'wayang', specifically in the famous Mahabharata tale. Wayang is the traditional Indonesian puppetry and drama which has its root in Hinduism. It is now an ingrained part of Indonesian culture and heritage.

Antaboga's name in his youth is Nagasesa. His father, Antawisesa is a giant snake who weds the goddess Dewi Sayati, daughter of Sang Hyang Wenang, the Principal God. Due to his services to heavenly beings, Nagasesa is honoured with the title 'Bathara' or 'Sang Hyang', which means 'God'. Since then, he is called Sang Hyang Antaboga, in recognition of his new position. His other names are Sang Hyang Nagasesa, Sang Hyang Anantaboga and Sang Hyang Basuki. As a God, Sang Hyang Antaboga is master of the underworld, which in wayang rates as significant as the realm above. His palace is in Saptapratala, the seventh plane below earth.

Sang Hyang Antaboga adopts a human outlook in his customary appearance. In critical situations, he can change his form into a giant snake. He possesses a magical power which enables him to alter his exterior according to his will. As the guardian of the holy water Amerta, he is also endowed with the ability to bring back to life those who die earlier than their natural time.

With the objective of strengthening the tie between them, the Gods reward Sang Hyang Antaboga with a female deity, Dewi Supreti, for a wife. One of the children from this marriage, Dewi Nagagini, will one day marry Bima or Werkudara, the second son of Pandawa family. Bima is one of the central figures in Mahabharata story.

In Indonesian or Javanese mythology, the word 'Naga' means a giant snake. The Indonesian word for snake itself is 'ular'. It is common practice for the Indonesians however to use the two words simultaneously, hence 'ular naga,' to describe a giant snake. Ular naga is widely revered. It is believed to be sacred and bring luck.

The logo of the Indonesian Biomedical Journal, which expresses its mission and vision, is a varied adaptation of the Caduceus staff. The pair of wings on top of the staff represents the speed of information and transformation, thus creation of a new beginning. The staff itself stands for authority. Likewise, in ancient Greek mythology, the pair of snakes or in this logo; the Antabogas, symbolizes the source of life and wisdom. Their intertwining position or 'double helix' incidentally is also the shape of DNA and signifies creation and stability.

In short, the logo of the Indonesian Biomedical Journal represents its mission to assist, enlighten and support all health related policies by delivering information with speed.

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Content

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p.153-6

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Widowati W, Maesaroh, Fauziah N, Erawijantari PP, Sandra F
p.157-62

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p.163-6

RESEARCH ARTICLE

Free Radical Scavenging and α -/ β -glucosidase Inhibitory Activities of Rambutan (*Nephelium lappaceum* L.) Peel ExtractWahyu Widowati^{1,2}, Maesaroh¹, Nurul Fauziah¹, Pande Putu Erawijantari¹, Ferry Sandra^{3,4,*}¹Faculty of Medicine, Maranatha Christian University, Jl. Prof. drg. Suria Sumantri No. 65, Bandung 40164, Indonesia²Biomolecular and Biomedical Research Center, Aretha Medika Utama, Jl. Babakan Jeruk 2 No. 9, Bandung 40163, Indonesia³Department of Biochemistry and Molecular Biology, Faculty of Dentistry, Trisakti University, Jl. Kyai Tapa No.260, Jakarta, Indonesia⁴Prodia Clinical Laboratory, Prodia Tower, Jl. Kramat Raya No.150, Jakarta, Indonesia

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Abstract

BACKGROUND: Diabetes mellitus (DM) is associated with oxidative reaction and hyperglycemic condition. Human body has an antioxidant defense system toward free radical, but overproduction of free radical causing imbalance condition between the free radical and the antioxidant defense in the body that lead to several diseases, including DM. Glucosidase is an enzyme that hydrolyze carbohydrates causing increase of blood glucose level, so by inhibiting this enzyme blood glucose level in plasma could be effectively decreased. Rambutan (*Nephelium lappaceum* L.) peel has been reported to have many potential roles, such as antioxidant and anti-glycemia. Therefore our current study was conducted to evaluate possible effectivity of Rambutan peel to scavenge free radical and to inhibit α - and β -glucosidases.

METHODS: Rambutan peel extraction (RPE) was performed based on maceration method. Geraniin was used as control. For antioxidant study, 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging test was performed. For glucosidase inhibitory activity study,

α - and β -glucosidases inhibitory activity tests were performed. Results were analyzed for median of Inhibitory Concentration (IC₅₀).

RESULTS: The scavenging activity of RPE was comparable with Geraniin. Meanwhile, the α -glucosidase inhibitory activity of RPE was higher than the one of Geraniin. The α -glucosidase-inhibitory-activity IC₅₀ of RPE and Geraniin were 0.106±0.080 μ g/ml and 16.12±0.29 μ g/ml, respectively. The β -glucosidase inhibitory activity of RPE was also higher than the one of Geraniin. The β -glucosidase-inhibitory-activity IC₅₀ of RPE and Geraniin were 7.02±0.99 μ g/ml and 19.81±0.66 μ g/ml, respectively.

CONCLUSION: Since RPE showed comparable free radical scavenging activity with Geraniin and higher α - and β -glucosidases inhibitory activities than Geraniin,, RPE could be suggested as a promising antioxidant and anti-glycemic agent.

KEYWORDS: *Nephelium lappaceum* L., rambutan, hypoglycemic, antioxidant, free radical, diabetes mellitus, glucosidase, DPPH

*Indones Biomed J. 2015; 7(3): 157-62***Introduction**

Diabetes mellitus (DM) is among the largest contributors to global mortality through its long term complications.(1) Free

radicals act significant role in development of DM. Insulin resistance and β -cell dysfunction are caused by oxidative stress.(20) Antioxidants can interfere the oxidation process by reacting with free radical, chelating catalytic metals, and also by acting as oxygen scavenger.(3) A free radical is a

single unpaired electron. Reactive oxygen species (ROS) is one of the most concern free radical. The human body has an antioxidant defense system toward free radical, but overproduction of free radical causing imbalance condition between the free radical and the antioxidant defense in the body that lead to several diseases.(4-7) Free radical scavenger properties are needed in DM treatment.

DM is a common disease which can be characterized by hyperglycemic condition or abnormally high plasma glucose level.(8) Control of postprandial blood glucose level is critical in treating DM.(9) Glucosidase is an enzyme that hydrolyze carbohydrates causing increase of blood glucose level, so by inhibiting this enzyme blood glucose level in plasma could be effectively decreased.(10) One of therapeutic approaches to treat DM is to retard the absorption of glucose via inhibitions of several glucosidase including α - and β -glucosidases. Elevation of blood sugar following a carbohydrate meal can be decreased by inhibiting this enzyme.(11,12).

The plant has been suggested as a rich source for anti-diabetic drug.(13) Rambutan (*Nephelium lappaceum* L.) is a tropical fruit from Southeast Asia. This fruit was shown to exhibit high antioxidant activity.(14) Therefore our current study was conducted to evaluate possible effectivity of Rambutan peel to scavenge free radical and to inhibit α - and β -glucosidases.

Methods

Rambutan Extraction

Extraction was performed based on maceration method. (15-17) Rambutans were collected from Kesamben-Blitar plantation, East Java, Indonesia. Dried and milled rambutan peels were soaked in 70% distilled ethanol, then were evaporated. Geraniin, a typically ellagitannin isolated from *Geranium thunbergii*, was used as control due to its potential as glucose inhibitor and free radical scavenger. Geraniin was commercially available (Cat. No. 60976-49-0, Cengdu Biopurify Phytochemicals, Chennngdu, China).

2,2-diphenyl-1-picrylhydrazyl (DPPH) Free Radical Scavenging Test

Fifty μ l sample/extract was introduced in 96-well microplate and 200 μ l of 0.077 mmol DPPH in dimethyl sulfoxide (DMSO) were added. The mixture was shaken vigorously and incubated in a dark room, at room temperature, for 30 min. Afterthat, measurement at 517 nm absorbance using a microplate reader (Multiskan™ GO Microplate

Spectrophotometer, Thermo Scientific, Waltham, MA, USA) was performed. For negative controls, 250 μ l DPPH was used. For blank, 250 μ l methanol was used.(16-18) . The DPPH scavenging activity (%) was calculated as follows:

$$\text{Scavenging Activity (\%)} = (\text{Ac}-\text{As})/\text{Ac} \times 100$$

As: sample absorbance

Ac: negative control absorbance (without sample)

α -glucosidase Inhibitory Activity Test

The α -glucosidase inhibitory activity was tested with modification.(19,20) Briefly, each sample was diluted in 10% DMSO. Five μ L of sample, 25 μ l of 200 mM p-nitrophenyl- α -glucopyranoside, 45 μ l phosphate buffer saline (PBS) (pH.7), 25 μ l of *Saccharomyces sp.* yeast α -glucosidase were introduced in the microplate and incubated at 37°C for 5 min. The reaction was stopped by adding 100 μ L of 200 mM Na₂CO₃ and then measured at 400 nm using a microplate reader. For control, 10% DMSO merely was used. The α -glucosidase inhibitory activity was calculated as follows:

$$\alpha\text{-glucosidase inhibitory activity (unit/L)} = (\text{Ac}-\text{As})/\text{Ac} \times 100$$

As: sample absorbance

Ac: negative control absorbance (without sample)

β -glucosidase Inhibitory Activity Test

The β -glucosidase inhibitory activity was assayed according to Sigma-Aldrich protocol. Twenty μ l of each sample was transferred into 96 well plate. Then 200 μ l master mix reaction was added. Initial absorbance was measured at 405. Then the samples were incubated at 37°C for 20 min. then the final absorbance was measured at 405 mn. The β -glucosidase inhibitory activity was calculated as follows:

$$\beta\text{-glucosidase inhibitory activity (unit/L)} = (\text{Af}-\text{Ai})/(\text{Ar}-\text{Aw}) \times 250$$

Af: final absorbance

Ai: initial absorbance

Ar: calibrator absorbance

Aw: water absorbance

Results

With the maseration method, from 400 g of dried and milled rambutan peel, we obtained 45 g of extract. Rambutan peel extract (RPE) was then tested for the DPPH scavenging activity, α - and β -glucosidases inhibitory activities.

DPPH Free Radical Scavenging Activity

DPPH free radical scavenging activity can be used to determine antioxidant capacity of plant. The scavenging activities of RPE and Geraniin can be seen at Figure 1, while the IC_{50} values were shown in Table 1. The scavenging activity of RPE was comparable with Geraniin.

α -glucosidase Inhibitory Activity

The α -glucosidase inhibitory activities of RPE and Geraniin were shown in Table 3. The assay was measured in triplicate for each sample. The α -glucosidase inhibitory activity of RPE was higher than the one of Geraniin. The α -glucosidase-inhibitory-activity IC_{50} of RPE was 0.106 ± 0.080 , while the one of Geraniin was 16.12 ± 0.29 .

β -glucosidase Inhibitory Activity

The β -glucosidase inhibitory activity is determined by a reaction in which β -glucosidase hidrolizes p-nitrophenyl-b-D-glucopyranoside resulting in the formation of a

colorimetric product at 405 nm.(17) The result of this test is presented in Figure 2 and Table 2. The β -glucosidase inhibitory activity of RPE was higher than the one of Geraniin. The β -glucosidase-inhibitory-activity IC_{50} of RPE was 7.02 ± 0.99 , while the of Geraniin was 19.81 ± 0.66 .

Table 1. DPPH Free Radical Scavenging Activity IC_{50} of RPE and Geraniin.

Samples	Equation	R ²	IC ₅₀	Average IC ₅₀
RPE Test 1	y=13.935x+10.346	0.959	2.85	
RPE Test 2	y=13.831x+9.8118	0.9633	2.91	
RPE Test 3	y=14.212x+8.1402	0.9644	2.95	
Average of RPE	y=13.933x+9.4326	0.9634	2.91	2.90±0.05
Geraniin Test 1	y=13.505x+11.317	0.9247	2.86	
Geraniin Test 2	y=13.629x+11.141	0.908	2.85	
Geraniin Test 3	y=13.679x+10.655	0.9225	2.88	
Average of Geraniin	y=13.634x+11.038	0.9203	2.86	2.86±0.01

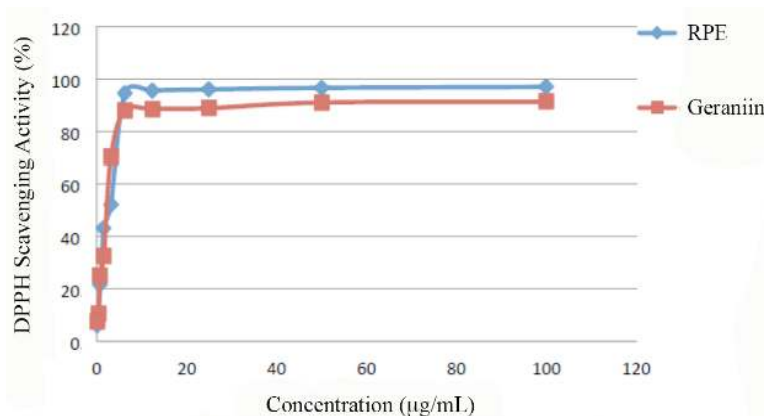


Figure 1. DPPH Free Radical Scavenging Activity of RPE and Geraniin. RPE and Geraniin were diluted in methanol to reach the final concentrations of 100, 50, 25, 12.5, 6.25, 3.125, 1.563, 0.781, 0.391, 0.195 μ g/mL.

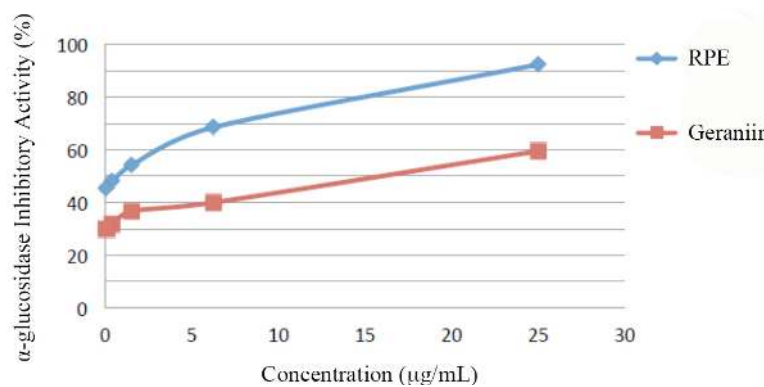


Figure 2. The α -glucosidase inhibitor activity of RPE and Geraniin. RPE and Geraniin were diluted in 10% DMSO to reach the final concentrations of 25, 6.25, 1.563, 0.398, 0.078 μ g/mL.

Table 2. The α -glucosidase inhibitor activity IC_{50} of RPE and Geraniin.

Samples	Equation	R ²	IC ₅₀	Average IC ₅₀
RPE Test 1	y=1.8298x+49.974	0.9353	0.014	
RPE Test 2	y=1.7519x+49.748	0.9303	0.144	
RPE Test 3	y=1.7494x+49.718	0.9277	0.161	
Average of RPE	y=1.7882x+49.993	0.9299	0.004	0.106±0.080
Geraniin Test 1	y=1.0758x+32.343	0.9566	16.41	
Geraniin Test 2	y=1.1158x+32.324	0.9793	15.84	
Geraniin Test 3	y=1.1348x+31.734	0.9672	16.1	
Average of Geraniin	y=1.1088x+32.134	0.9711	16.11	16.12±0.29

Table 3. The β -glucosidase inhibitory activity IC_{50} of RPE and Geraniin.

Samples	Equation	R ²	IC ₅₀	Average IC ₅₀
RPE Test 1	y=1.2443x+41.75	0.9276	6.63	
RPE Test 2	y=1.0288x+43.532	0.9378	6.29	
RPE Test 3	y=1.0799x+41.21	0.8905	8.14	
Average of RPE	y=1.1176x+42.164	0.9274	7.01	7.02±0.99
Geraniin Test 1	y=0.945x+30.709	0.9132	20.41	
Geraniin Test 2	y=1.0304x+30.321	0.8539	19.1	
Geraniin Test 3	y=0.9038x+31.632	0.7313	19.92	
Average of Geraniin	y=0.9597x+30.887	0.8552	19.92	19.81±0.66

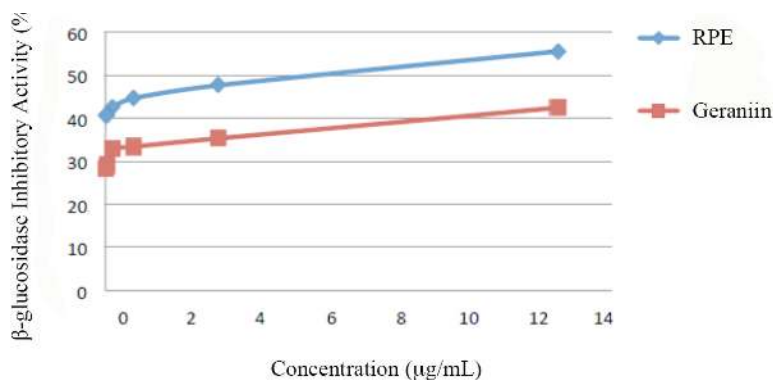


Figure 3. The β -glucosidase inhibitor activity of RPE and Geraniin. RPE and Geraniin were diluted in 10% DMSO to reach the final concentrations of 25, 6.25, 1.563, 0.398, 0.078 μ g/mL.

Discussion

The peel of rambutan, which is usually discarded, was found to have extremely high antioxidant activity.(21) Antioxidant can stabilize free radicals that could cause oxidative damage to the cells. Our result shows that RPE and Geraniin have comparable antioxidant activities. This result confirmed previous study reporting that RPE has the highest free radical scavenging activity in comparison to mangosteen and langsung peels.(22) RPE has antioxidant activity due to its phenolic component.(23) Geraniin was reported to be the major compound of RPE.(24) Previous study reported the Geraniin free radical scavenging activity by using the radical galvinoxil ($IC_{50} = 1.9 \mu$ M) and 3-ethylbenzthiazoline-6-sulfonate (ABTS) ($IC_{50} = 6.9 \mu$ M), and indicated that Geraniin has similar antioxidant activity with RPE.(25) The high potential for scavenging free radical could inhibit spreading of oxidation.(26) RPE

which showed high antioxidant activity through free radical scavenging activity, similar to Geraniin, could be potential for DM patients.

Glucosidase inhibitors play a role for disruption of the activity of glucosidase, an enzyme that cleaves the glycosidic bond. These inhibitors have played a vital role in the functions of glucosidases in living system by modifying or blocking specific metabolic processes. This led to several applications of these chemical entities in agriculture and medicine.(27) The α - and β -glucosidases are carbohydrate hydrolyzing enzymes that related to metabolic disorder such as DM. Inhibition carbohydrate hydrolyzing enzymes could be therapeutic approach to decrease hyperglycemia.(28,29) Our present study shows that both RPE has activities to inhibit α - and β -glucosidases. Previous study state that Geraniin and RPE can be potential sources as anti-glycemic agents.(30)

The α -glucosidase inhibitors seem to be the most effective in reducing hyperglycemia that occurred in DM by

delaying the absorption of carbohydrate in small intestine. Importantly, these agents could reduce the blood glucose without increasing insulin secretion and do not cause hypoglycemia or weight gain. In individual with type 2 DM, the inhibition of α -glucosidase activity can reduce hemoglobin A1c (HbA1C) and postprandial insulin levels. In addition, treatment with α -glucosidase inhibitor can improve lipid metabolism, reduce fasting plasma glucose levels, and improve insulin sensitivity.(31)

Conclusion

RPE has the property of free radical scavenging and α - and β -glucosidases inhibitory activities. The present study shows that RPE and Geraniin have a potency as antioxidant and anti-glycemic agents.

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References

- Somsak L, Naqya V, Hadady Z, Dosca T, Gergely P. Glucose analog inhibitors of glycogen phosphorylases as potential antidiabetic agents: recent developments. *Curr Pharm Des.* 2003; 9: 1177-89.
- Ceriello A, Motz E. Is oxidative stress the pathogenic mechanism underlying insulin resistance, diabetes, and cardiovascular disease? The common soil hypothesis revisited. *Arterioscler Thromb Vasc Biol.* 2004; 24: 816-23.
- Caillet S, Lorenzo G, Côté J, Sylvain JF, Lacroix M. Free radical-scavenging properties and antioxidant activity of fractions from cranberry products. *FNS.* 2012; 3: 337-47.
- Valko M, Leibfritz D, Moncol J, Cronin MT, Mazur M, Telser J. Free radicals and antioxidants in normal physiological functions and human disease. *Int J Biochem Cell Biol.* 2007; 39: 44-84.
- Bahorun T, Soobrattee MA, Luximon-Ramma V, Aruoma OI. Free radicals and antioxidants in cardiovascular health and disease. *IJMU.* 2006; 1: 25-41.
- Lobo V, Patil A, Phatak A, Chandra N. Free radicals, antioxidants and functional foods: Impacts on human health. *Pharmacogn Rev.* 2010; 4: 118-26.
- Mayne ST. Antioxidant nutrients and chronic disease: use of biomarkers of exposure and oxidative stress status in epidemiologic research. *J Nutr.* 2003; 133 (Suppl 3): 933-40.
- Zhao LY, Lan QJ, Huang ZC, Ouyang LJ, Zeng FH. Antidiabetic effect of a newly identified component of *Opuntia dillenii* polysaccharides. *Phytomedicine.* 2011; 18: 661-8.
- Rendell M. The role of sulphonylureas in the management of type 2 diabetes mellitus. *Drugs.* 2004; 64: 1339-58.
- Murai A, Iwamura K, Takada M, Ogawa K, Usui T, Okumura J. Control of postprandial hyperglycaemia by galactosyl maltobionolactone and its novel anti-amylase effect in mice. *Life Sci.* 2002; 71: 1405-15.
- Lebovitz H. Alpha-Glucosidase inhibitors. *Endocrinol Metab Clin North Am.* 1997; 26: 539-51.
- Kumar S, Narwal S, Kumar V, Prakash O. Alpha-glucosidase inhibitors from plants: A natural approach to treat diabetes. *Pharmacogn Rev.* 2011; 5: 19-29.
- Mukherjee PK, Maiti K, Mukherjee K, Houghton PJ. Leads from Indian medicinal plants with hypoglycemic potentials. *J Ethnopharmacol.* 2006; 106: 1-28.
- Palanisamy U, Cheng HM, Masilamani T, Subramaniam T, Ling LT, Radhakrishna AK. Rind of rambutan, *Nephelium lappaceum*, a potential source of natural antioxidants. *Food Chem.* 2008; 109: 54-63.
- Widowati W, Ratnawati H, Rusdi DU, Winarno W, Kasim F. The antiplatelet aggregation effect of extract and ethyl acetate fraction of velvet bean seed (*Mucuna pruriens* L.) in dyslipidemic rat. *AgriTech.* 2011; 31: 52-9.
- Widowati W, Wijaya L, Wargasetia TL, Yellianty Y, Laksmiawati DR. Antioxidant, anticancer, and apoptosis-inducing effects of Piper extracts in HeLa cells. *J Exp Integr Med.* 2013; 3: 225-30.
- Widowati W, Herlina T, Ratnawati H, Mozef T, Risdian C. Antioxidant and platelet aggregation inhibitor activities of black tea (*Camellia sinensis* L.) extract and fractions. *Med Plants.* 2011; 3: 21-6.
- Molyneux P. The use of the stable free radical diphenylpicrylhydrazyl (DPPH) for estimating antioxidant activity. *Songklanakarin J Sci Technol.* 2004; 26: 211-9.
- Kim YM, Wang MH, Rhee HI. A novel α -glucosidase inhibitor from pine bark. *Carbohydr Res.* 2004; 339: 715-7.
- Widowati W, Ratnawati H, Retnaningsih CH, Lindayani, Rusdi DU, Winarno W. Free radical scavenging and α -glucosidase inhibitor activity of ethanolic extract of *Mucuna pruriens* L. *JFI.* 2011; 5: 117-24.
- Samuagam L, Sia CM, Akouwah GA, Okechukwu PN, Yim HS. The effect of extraction condition on total phenolic content and free radical scavenging capacity of selected tropical fruits' peel. *HEJ.* 2013; 4: 80-102.
- Thitilertdech N, Teerawutgulrag A, Rakariyatham N. Antioxidant and antibacterial activities of *Nepheliumlappaceum* L. extracts. *LWT-Food Sci Technol.* 2008; 41: 2029-35.
- Palanisamy U, Ling LT, Manaharan T, Appleton D. Rapid Isolation of geraniin from *Nepheliumlappaceum* rind waste and its anti-hyperglycemic activity. *Food Chem.* 2011; 127: 21-7.
- Manaharan T, Palanisamy UD, Ming CH. Tropical Plant extracts as potential antihyperglycemic agents. *Molecules.* 2012; 17: 5915-23.
- Tachakittirungrod S, Okonogi S, Chowwanapoonpohn S. Study of antioxidant activity of certain plants in Thailand: mechanism of antioxidant action of guava leaf extract. *Food Chem.* 2007; 103: 381-8.
- Pandey S, Sree A, Dash SS, Sethi DP. A novel method for screening beta-glucosidase inhibitors. *BMC Microbiol.* 2013; 13: 55. doi: 10.1186/1471-2180-13-55.
- Sancheti S, Sancheti S, Seo SY. *Chaenomeles Sinensis*: A potent α - and β -glucosidase inhibitor, *Am J Pharmacol Toxicol.* 2009; 4: 8-11.

28. Toller M. Alpha-Glucosidase inhibitors in diabetes: efficacy in NIDDM subjects. *Euro J Clin Invest.* 1994; 24 (Suppl 3): 31-5.
29. Palanisamy U, Manaharan T, Teng LL, Radhakrishnan AKC, Subramainiam T, Masilamani T. Rambutan rind in the management of hyperglycemia. *Food Res Int.* 2011; 44: 2278-82.
30. LeRoith D, Taylor SI, Olefsky JM. *Diabetes Mellitus: a fundamental and clinical text.* 3rd ed. Philadelphia: Lippincott Williams and Wilkins; 2004.

LEMBAR HASIL PENILAIAN
SEJAWAT SEBIDANG atau PEER REVIEW

KARYA ILMIAH : JURNAL ILMIAH

Judul Karya Ilmiah (Artikel) : Free Radical Scavenging and α - β -glucosidase Inhibitory Activities of Rambutan (*Nephelium lappaceum* L.) Peel Extract.

Jumlah Penulis : 5 Orang

Nama-nama Penulis : **Wahyu Widowati**, Maesaroh, Nurul Fauziah, Pande Putu Erawijantari, Ferry Sandra

Status Penulis : Penulis Pertama / ~~Penulis ke-2~~ / ~~Penulis Korespondensi **~~

Identitas Jurnal Ilmiah :

- Nama jurnal : The Indonesian Biomedical Journal
- Nomor ISSN : 2085-3297
- Vol., No., Bulan, Tahun : Vol. 7; No. 3; Dec 2015
- Penerbit : Prodia Education and Research Institute.
- DOI Artikel (jika ada) : 10.18585/inabj.v7i3.180
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- Kecukupan & kemutakhiran data serta metodologi... *sumber data pustaka mutakhir, hasil penelitian membahas hubungan antioksidan dan antidiabetes*
- Kelengkapan unsur dan kualitas penerbit... *Jurnal Inabj terindeks scopus Q4 SJR 0,16*

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e. Indikasi plagiasi Tidak terdapat Indikasi plagiarisme atau self plagiarism

f. Kesesuaian bidang ilmu Paper sesuai dengan bidang Ilmu penulis pertama

REVIEWER 1



(Prof. Dr. Chrismis Novalinda Ginting, M.Kes)

NIK : 0115127801

UNIVERSITAS PRIMA INDONESIA

LEMBAR HASIL PENILAIAN
SEJAWAT SEBIDANG atau *PEER REVIEW*

KARYA ILMIAH : JURNAL ILMIAH

Judul Karya Ilmiah (Artikel) : Free Radical Scavenging and α - β -glucosidase Inhibitory Activities of Rambutan (*Nephelium lappaceum* L.) Peel Extract.
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 Nama-nama Penulis : **Wahyu Widowati**, Maesaroh, Nurul Fauziah, Pande Putu Erawijantari, Ferry Sandra
 Status Penulis : Penulis Pertama / ~~Penulis ke-2~~ / ~~Penulis Korespondensi~~ ******)
 Identitas Jurnal Ilmiah :

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- a. Kelengkapan dan kesesuaian unsur.....
Jurnal ini sudah cukup lengkap dan ada kesesuaian antara unsur dan isinya
- b. Ruang lingkup & kedalaman pembahasan.....
Ruang lingkup bahasan sudah memadai dan ada kedalaman pembahasannya
- c. Kecukupan & kemutakhiran data serta metodologi.....
Data-Data juga sumbernya representasinya yang digunakan cukup mutakhir dan juga kesimpulan yang dibuat cukup sahih.
- d. Kelengkapan unsur dan kualitas penerbit.....

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f. Kesesuaian bidang ilmu

Jurnal ini sudah sesuai dengan ilmu yang diteliti oleh penulis.

REVIEWER 2



(Prof. Dr. Ermi Girsang, M. Kes)

NIK : 0117057501

UNIVERSITAS PRIMA INDONESIA

LEMBAR HASIL PENILAIAN
SEJAWAT SEBIDANG atau *PEER REVIEW*

KARYA ILMIAH : JURNAL ILMIAH

Judul Karya Ilmiah (Artikel) : Free Radical Scavenging and α -/ β -glucosidase Inhibitory Activities of Rambutan (*Nephelium lappaceum* L.) Peel Extract.

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Status Penulis : Penulis Pertama / ~~Penulis ke-2~~ / ~~Penulis Korespondensi **~~)

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No	Komponen Yang Dinilai	Nilai Maksimal JURNAL ILMIAH			Nilai Akhir Yang Diperoleh *)
		Internasional / Bereputasi <input checked="" type="checkbox"/>	Nasional Terakreditasi <input type="checkbox"/>	Nasional ***) <input type="checkbox"/>	
a.	Kelengkapan unsur isi karya (10%)	4			3,35
b.	Ruang lingkup dan kedalaman pembahasan (30%)	12			11,45
c.	Kecukupan dan kemutakhiran data/informasi dan metodologi (30%)	12			11,55
d.	Kelengkapan unsur dan kualitas penerbitan (30%)	12			11,55
	Total	40			37,9

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- Jurnal ini sudah cukup lengkap dan ada kesesuaian antara unsur dan isinya*
- b. Ruang lingkup & kedalaman pembahasan. *Penelitian ini memanfaatkan limbah kulit rambutan sebagai antioksidan, anti diabetes secara in vivo*

Ruang lingkup bahasan sudah memadai dan ada kedalaman pembahasannya

c. Kecukupan & kemutakhiran data serta metodologi... sumber data pustaka mutakhir, hasil penelitian membahas hubungan anoksikan dan antidiabetes

Data-data juga sumber referensinya yang digunakan cukup mutakhir dan juga kesimpulan yang dibuat cukup sah

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Medan,
Reviewer 2

(Prof. Dr. Ermi Girsang, M.Kes)
NIK : 0117057501
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Medan,
Reviewer 1

(Prof. Dr. Chrismis Novalinda Ginting, M.Kes)
NIK : 0115127801
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