

The Opportunities of Using Malay Apple (*Syzygium malaccense* (L). Merr. & Perry) Wood Stem Extract as Halal and Thayyib Antidiabetic Drugs

Nenden Fauziah*¹, Astri Senania², Dhoni Anshar Nuari³, Marginingsih Setianingrum⁴

^{1,2}Chemistry Department, Mathematics and Science Faculty

^{3,4}Pharmacy Department, Mathematics and Science Faculty

Universitas Garut, Jati Street 42B, Garut, 44151, West Java, Indonesia

e-mail: *nendenfauziah@uniga.ac.id

*Correspondent Author

DOI: 10.5575/ijhar.v1i2.5328

ABSTRACT

The use of existing antidiabetic drugs generally causes dangerous side effects, while the use of insulin has a problem with the halal status of the ingredients. Treatment with halal and thayyib medicinal ingredients is needed by Muslims, so it is necessary to find antidiabetic drugs that are halal and thayyib. The use of natural materials such as malay apple can be a solution for halal medicine. The study on antihyperglycemic activity of extracts of malay apple stem wood have been done. In vivo studies were carried out on animal experiments in male swiss webster mice using the glucose tolerance method. The experimental results showed a decrease in blood glucose levels after feeding with extract of malay apple stem wood at doses of 100 mg/Kgbw, 200 mg/Kgbw and 400 mg/Kgbw, which were significantly different compared to the control group ($p < 0.05$), but effective doses shown at a dose of 100 mg/Kgbw. Measurement of moisture and ash content, levels of heavy metal and microbial contamination, showed that the simplicia of malay apple stem wood is safe. The results of this study indicate that malay apple wood extract is a material that is very likely to be used as antidiabetic drugs that are halal and thayyib.

Keywords: antidiabetic drugs, extract wood stem, halal and thayyib, malay apple.

1. Introduction

Diabetes mellitus (DM) is a degenerative disease that characterised by metabolism disruption of carbohydrate, fat and protein, with high levels of glucose in the blood (hyperglycemia) or blood sugar levels of urine (glucosuria) (Rismayanthi, 2010). DM is known as the silent killer, because it is often not realized by patient until complications occurred such as coronary heart disease, stroke and kidney failure. The mortality risk of DM is twice than non-DM in common (Anonim, 2014).

People with severe diabetes, must be given insulin therapy because of the insulin hormone in the body of people with DM cannot be used properly (Rismayanthi, 2010). The insulin hormone is released by the organs of the body called the pancreas; the insulin that being used in the therapy is generally isolated from the pancreas of cows or pigs (Nuryani et al., 2015). In Islamic law the use of parts of pigs and their derivatives is unlawful (haram), according to alqur'an in Al-Baqoroh 173 and Al-An'am 145

(Rahman, 2010), the use of this prohibited ingredients in drugs will have a negative impact on the user's faith, i.e the worship is invalid, not acceptable (in vain), sinful, and threatened with hell. The goal of treatment is to heal the patient, halal medicine guarantees healing and blessing from Allah SWT as stated in the Hadith narrated by Abu Daud from Abu Darda which said, Allah has sent down both the disease and the cure, and He has appointed a cure for every disease, so treat yourselves medically, but use nothing unlawful' (Sfaat, 2013).

Most of antidiabetic drugs that have been used have dangerous side effects (D'Adamo et al., 2006). It's became big challenge to find safe antidiabetic drugs. A safe material, is a material that is free from pathogenic microbes and harmful chemicals. It is also called an ingredient which is thayyib (Santosa, 2015). Natural antioxidants contained in plants have the ability to inhibit the occurrence of degenerative diseases, so the consumption of natural antioxidants can prevent or slow down diabetes

effects (Arumugam et al., 2014). The use of Malay Apple (*S. malaccense*) wood stem extract, is expected to give us new diabetes drugs that are halal and thayyib.

The Opportunities of Using the Malay Apple (*S. malaccense*) wood stem extract as antidiabetic are likely to be like the leaf part, that showing antioxidant and antidiabetic activity (Arumugam et al., 2014). The antioxidant activity of Malay Apple (*S. malaccense*) wood stem extract has been proven from previous studies (Fauziah & Musthapa, 2019), while the chances of antidiabetic activity can be seen from the presence of antihyperglycemic activity.

2. Materials and Methods

2.1. Plant Material

The Malay Apple tree that used as raw material source was taken from Sukawening village of Garut regency, West Java, in April 2018. The material that we used was a wooden tissue of Malay Apple stem without the bark, which then made dry powder with 2 weeks drying process.

2.2. Reagents and Solvents

The chemicals used in this research were ethanol as solvent extract, glibenclamide, tragacanth 1%, demineralized water, ethanol 95%, chloral hydrate, toluene, chlorophome, Na₂SO₄ anhydrous

2.3. Moisture and Ash Content

Determination of water content and ash content was carried out with the aim to determine the feasibility of a material as a raw material for medicine. In this study, the gravimetric method was used to determine ash content (BPOM, 2000) and distillation with toluena method for moisture content (Dewar & McDonald, 1961)

2.4. Determination of Metals and Microbial Contaminant

Determination of metals and microbial contamination were carried out at Agro Based Industry Calibration and Analytical Laboratories (ABICAL), Bogor, Indonesia. Determination of lead and cadmium levels with the test method that refers to AOAC 999.1 1 (9. 1.09.2005). Determination of lead and mercury refer to SNI 01-2896-1998 and arsenic refers to SNI 01-4866-1998. While the determination of microbial contamination, that is, *E. coli* refers to BAM 2002, *Salmonella* refers to ISO 6579: 2002.

Fungi and yeast refers to BAM 2001, and *Bacillus cereus* refer to AOAC 18th ed. 2005

2.5. Extraction

Simplicia of stem of Malay Apple (0.4 kg) was macerated for 3 x 24 hours using 95% ethanol (Aksara et al., 2013). The extract that has been collected was then evaporated using a Rotary Vacuum Evaporator IKA RV 10 B to obtain dry ethanol extract.

2.6. Measurement of Hyperglycemia

The antihyperglycemic activity was carried out using glucose tolerance method (Adnyana et al., 2004). Thirty (30) Swiss webster male mice at age 2-3 month were weighed after fasting for 18 hour without limitation drinking acces. Measurement of glucose level was done using a glucometer. Mice were divided into 6 groups, the negative control group was given aquadest, positive control group was given suspension of 1% tragacanth, comparison group was given glibenclamide 5 mg/kgbw, test group 1, 2, and 3 were given ethanol extract of Malay Apple wood stem at doses of 100, 200, and 400 mg/kgbw respectively. 30 minutes later, glucose solution 2 g/kg bw were given to all group except negative control. The measurement of blood glucose level were carried out at 30, 60, 90, 120 after glucose feed

3. Results and Discussion

The results of the sample determination from the laboratory at the School of Biological Sciences and Technology of ITB stated that the samples taken from plants known as Jambu bol or Malay apple or pomerac were from the species of *Syzygium malaccense* (L). Merr. & Perry, familia of Myrtaceae, Myrtales, Rosidae class, Magnoliopsida Class, and Magnoliophyta Division. The determination shown water content and ash content of simplicia were below the maximum level that means the wooden of Malay Apple stem is safe to use as medicine or food (Table 1) (Sardjon et al., 2012).

Table 1. Moisture and ash content of wooden tissue of malay Apple

Parameter	Wood tissue	Standard* (Maximum Level)
Moisture content (%)	4,6%	≤ 10%
Ash Content(%)	3,22%	≤ 10%

*Indonesia Ministry of Health Regulations no 661/MENKES/SK/VII/1994

The examination results on metal contaminant and microbial contamination refer to previous studies with the same sample (Fauziah & Musthapa, 2019). The analysis was based on SNI (Indonesian National Standard) 7387: 2009 concerning the maximum limit of metal contaminants in food. It shows that the contents of Pb, Cadmium (Cd), Tin (Sn), Mercury (Hg) and Arsenic (As) in the simplicia on wooden tissue of Malay Apple stem were under the maximum limit. This shows that simplicia is safe for use as medicine and food. Likewise, the results of the examination of microbial contamination showed similar results (Sardjon et al., 2012). Because of the simplicia is safe for use as medicine and food, so the extract of wooden tissue of Malay Apple stem have thoyyib category.

The selection of extraction techniques was based on the physicochemical properties of the extract being studied. The selected extraction method was cold maceration. The dried and powdered of the wooden Malay Apple (0.4 kg) was macerated with ethanol 95% (Fauziah & Musthapa, 2019). Extraction results obtained in the form of a clear yellow solution with a distinctive aroma of Malay Apple (*S. malaccense*), after evaporation obtained 11.03 g of dried extract.

The results of the antihyperglycemic activity test on ethanol extract from the wooden tissue of the Malay Apple stem are shown in the Figure 1.

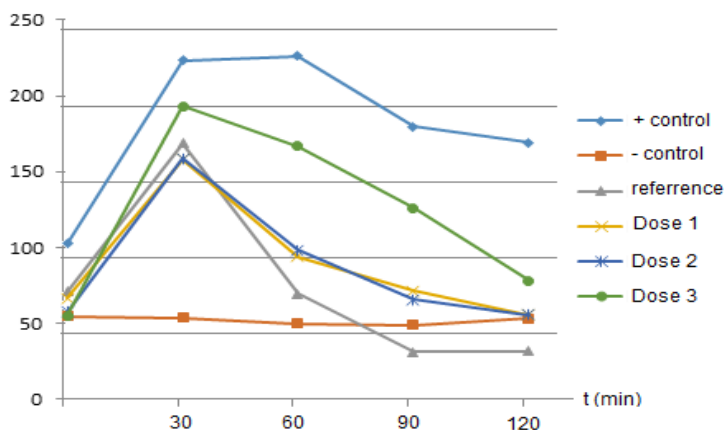


Figure.1. Graph of Average Blood Glucose Levels in Mice Before and After Treatment.

The negative control group (without glucose induction), showed stable glucose levels, indicating a validation as other factors beyond glucose induction did not interfere with the validation of the test results.

Mice that were only given a glucose solution (control group) showed an increase in blood glucose levels (hyperglycemia) in the 30th minute and in the 120th minute the glucose level returned to decline, but still in the condition of hyperglycemia. This happens because glucose induction can cause an increase in blood glucose levels and after 2 hours returned to decline because of some glucose has entered the cell (Adnyana et al., 2004).

The pattern of changes in the reference group, the 1, 2 and 3 dose groups were almost the same, indicating that Malay Apple stem wood extract had an antihyperglycemic effect similar to glibenclamide which was a reference

drug (Adnyana et al., 2004). The ability of ethanol extract of malay Apple stem wood in reducing sugar blood levels might be due to the content of secondary metabolites it has such as flavanoids, tannins, saponins, steroids / triterpenoids, phenols and quinones (Fauziah & Musthapa, 2019).

Based on data (Figure 2), it appears that the control group (+) in the 30th minute experienced an increase in blood glucose levels because the positive control was only given a tragacanth 1% suspension and was unable to suppress blood glucose levels after glucose absorption which can stimulate insulin release so that in the 60th minute to the 120th minute there was a decrease in blood glucose levels

The results of the Kruskal-Wallis (Wulandari, 2016) statistic test showed a significant decrease in blood glucose levels ($p < 0.05$) in the positive group compared to the

negative control group in the 60th, 90th and 120th minutes. The Dose of 100 mg/Kgbw extract showed a significant difference of $p < 0.05$ with positive control at 60th, 90th, 120th min, with a decrease in blood glucose as much as 27.4 mg/dL, 4.8 mg/dL, -11mg/dL. The dose of 200 mg/Kgbw extract, showed a significantly different $p < 0.05$ with positive controls at 60, 90 and 120 minutes with a decrease in blood glucose of 40.6 mg/dL, 8.2 mg/dL, -2 mg/dL. Moreover, the dose of 400 mg/Kgbw showed a

significantly different $p < 0.05$ with positive control at 120 minutes with a decrease in blood glucose 23.4 mg/dL. These indicate that the dose of 1, 2, 3 has the effect of decreasing blood glucose or hyperglycemic levels, but the dose of 100 mg/Kgbw is the most effective dose as antihyperglycemia because the activity is better than the dose of 200 mg/Kgbw and 400 mg/Kgbw

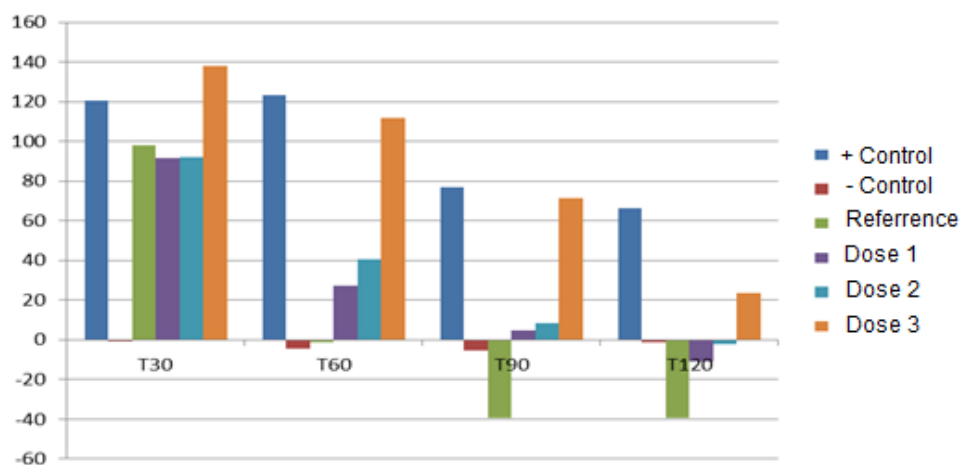


Figure 2. Difference in Blood Glucose Levels in Mice Before and After Treatment

4. Conclusion

The results of this study showed that the wood stem of Malay Apple extract have antihyperglycemia activity, and have a big potential to become halal and thayyib antidiabetic drug. The most effective dose of the wood stem of Malay Apple extract was 100 mg/Kgbw.

Acknowledgements

Big gratitude for the assistance and support from the leaders and all staff of the Mathematics and Science Faculty. Also acknowledgments for the assistance and support of the leaders and all staff of LPPM UNIGA.

References

- Adnyana, I. K., Yulinah, E., Soemardji, A.A., Kumolosasi, E., Iwo, M. I., Sigit, J. I. & Suwendar. (2004). Uji Aktivitas Antidiabetes Ekstrak Etanol Buah Mengkudu (*Morinda citrifolia* L.). *Acta Pharmaceutica Indonesia*, 29(2), 43-49.
- Aksara, R., Musa, W. J. A. & Alio, L. (2013). Identifikasi Senyawa Alkaloid dari Ekstrak Metanol Kulit Batang Mangga (*Mangifera indica* L.). *Jurnal Entropi*, 8(1), 514-519.
- Anonim. (2014). Situasi dan analisis Diabetes, Pusat Data dan Informasi Kementerian Kesehatan RI.
- Arumugam, B., Manaharan, T., Heng, C. K., Kuppasamy, U. R. & Palanisamy, U. D. (2014). Antioxidant and Antiglycemic Potentials of a Standardized Extract of *Syzygium malaccense*. *LWT - Food Science and Technology*, 59(2), 707-712.
- BPOM. (2000). *Parameter Standar Umum Ekstrak Tumbuhan Obat*. Jakarta: BPOM Direktorat Pengawasan Obat Tradisional.
- D'Adamo, Peter, J. & Catherine, W. (2006). *Diabetes: Penemuan Baru Memerangi Diabetes Melalui Diet Golongan Darah*. Yogyakarta : Bentang Pustaka.
- Dewar, W. A. & McDonald, P. (1961). Determination of Dry Matter in Silage By. *Journal of the Science of Food and Agriculture*, 12(11), 790-795.
- Fauziah, N. & Musthapa, I. (2019). The Utilization of Jambu Bol (*Syzygium malaccense* (L). Merr. & Perry) Stem as a New Source of Antioxidants (Pemanfaatan Kayu Batang Jambu Bol (*Syzygium malaccense* (L). Merr. & Perry)

- sebagai Sumber Antioksidan Baru.) *Jurnal Ilmiah Farmako Bahari*, 10(1), 33-41.
- Giugliano, D., Ceriello, A. & Esposito, K. (2008), Glucose Metabolism and Hyperglycemia, *Am J Clin Nutr*, 87, 17-22.
- Nuryani, A., Pratiwi, N. & Mohammad, A. B. (2015). *Fikiran Masyarakat*, 3(1), 13 -21.
- Rahman, Z. A. (2010). *Jemaah Haji Malaysia Menggunakan Vaksin Haram?*. Retrived from www.zaharuddin.net.
- Rismayanthi, C. (2010). *Terapi Insulin Sebagai Alternatif*. 7(2), 29-37.
- Santosa, U. (2015). *Makanan Yang Thayyib*, *Jurnal Civitas Akademika*. Retrived from sivitasakademika.wordpress.com/
- Sardjon, R. E., Musthapa, I., Solihin, H. & Ramdhani, R. (2012). Physicochemical Composition of Indonesian velvet bean (*Mucuna pruriens* L.) *Global Journal of Research on Medicinal Plants & Indigenous Medicine*, 1(4), 101-108.
- Sfaat, I. (2013). MUI : Produk Farmasi dan obat-obatan Harus Halal. Retrived from <https://www.nahimunkar.org/>
- Wulandari, W. (2016). Uji Efektivitas Antihiperqlikemia Kombinasi Jus Pare (*Momordica charantia* L) dan Jus Tomat (*Solanum lycopersicum* L) pada Tikus Wistar Jantan dengan Metode Toleransi Glukosa. *Pharmaceutical Sciences and Research*, 3(3), 145-154.