

THE POTENCY OF KERSEN LEAVES (*Muntingia calabura* Linn.) TO DECREASE HIGH BLOOD SUGAR LEVEL – A LITERATURE REVIEW

Ihlana Nairfana¹ dan I Ketut Suter²

¹Department of Agricultural Product Technology, Faculty of Agricultural Technology, Universitas Teknologi Sumbawa

²Faculty of Agricultural Technology, Universitas Udayana

*email: ihlana.nairfana@uts.ac.id

ABSTRACT

Along with the increasing prevalence of diabetes mellitus in Indonesia in the past 5 years, various studies has been conducted related to drugs that can be used to decrease blood sugar levels. Natural materials become prevered alternative treatment to decrease high blood sugar level especially with the high cost of synthetic drugs, limited availability and the increasing understanding of medicinal plants. This literature review discusses the potency of Kersen leaf extract (*Muntingia calabura* Linn.) as an alternative to decrease high blood sugar. According to various studies, kersen leaves contain flavonoids that are thought to have antidiabetic pharmacological effects. Flavonoids are able to decrease high blood sugar by inhibiting the breakdown of carbohydrates into sugars and inhibiting the absorption of sugar in the small intestine, stimulating insulin secretion by pancreatic β cells, activating insulin receptors, and repairing damaged pancreatic β cells through antioxidant activity. A number of studies have been conducted to show the hypoglycemic effects of kersen leaves extract by using different experimental models with different doses.

Keywords : Kersen, High Blood Sugar, Flavonoids.

INTRODUCTION

Diabetes is a chronic disorder in the metabolism of carbohydrates, fats and proteins. Diabetes results from either insulin deficiency or malfunction (Akter et.al, 2014). Treating diabetes requires drug treatments and lifestyle changes. Nowadays there are many options used to treat diabetes such as drug

therapy, pharmacoteraphy and diet therapy (Apriyanti, 2016). Drug therapy such as insulin treatments are most often used amongst the others because it is easy to apply and giving fast result. Although it is most often used, drug therapy have some disadvantages including drug resistance, side effects and even toxicity therefore treatments with medicinal plants are recommended (Apriyanti, 2016; Malviya et.al, 2010).

Most plant contains natural materials such as secondary metabolites that often have anti-diabetic effects. Many researches in Indonesia have been studying about Kersen (*Muntingia calabura* Linn.) leaf extract over the past few years, and the results shown that kersen leaf extract has the ability to decrease high blood sugar level significantly (Hajiaghaalipour and Arya, 2015). Kersen leaves extract contain flavonoids that are thought to have antidiabetic pharmacological effects (Brahmachari, 2011). The main purpose of this article is to introduce Kersen leaf as an effective medicinal plants used for treating diabetes

METHOD

Publication regarding diabetes and the potency of kersen leaf extract to decrease high blood sugar level can be found in databases such as Science Direct, Proquest, Google Scholar and Scopus. Kersen can also be abbreviated as Talok, Singgepor and Jamaican Cherry (Kram and Keller, 2001). Keywords used in this review included “kersen”, “Jamaican cherry”, diabetes and medicinal plants. Out of the 54 collected articles published between 2001 until 2017, 13 were used to publish this review. The search was restricted to English and Indonesian language articles.

RESULTS AND DISCUSSION

Previous studies regarding the potency of Kersen leaves to decrease high blood sugar level are stated by Apriyanti (2016) with Pre and Post test control group design with 25 diabetic rats treated with different doses of kersen leaf extract (0,1875 g/kg body weight, 0,25 g/kg body weight, 0,3125 g/kg body weight). Blood sugar samples were collected on 0, 30, 60, 90 and 120 minutes after treated with different doses of kersen leaf extract. The results shown that kersen leaf extract of 0,3125 g/kg body weight significantly decrease rat's blood sugar level. Another study also stated Pre and Post test control group design with 12 diabetic person treated with kersen leaf extract (dose unknown). The results shown that the

average blood sugar levels after intervention decreased by 305.58 to 178.33 mg/dl Kersen leaf extract significantly decrease respondent's blood sugar level (Musriana and Zahroh, 2016)

Pramono and Susanto (2014) also did an experiment using five groups of diabetic rats (induced with streptozotocin) were treated with kersen leaf extract. Their blood sample were collected for two weeks (once every week) and then analysed using ANOVA. The result shown that treatments with kersen leaf extract significantly decrease blood sugar level of diabetic rats if it is given with the dose of 100 mg/kg body weight. The present investigation, describes the phytochemical analysis, in vitro antioxidant and antidiabetic property of *Muntingia calabura* leaves extracts along with estimate the inorganic components of the leaves. Total phenolic and flavonoid content in the extracts were estimated by Singleton and Zhishen method. Ethanolic extract of leaves revealed the presence of high phenolic ($33.33 \pm 0.13 \mu\text{g GAE/mg}$) and flavonoid ($123.31 \pm 0.54 \mu\text{g CHE/mg}$) content. Treatment of Streptozotocin-Nicotinamide induced type II diabetic rats with extracts caused significant reduction in fasting blood glucose level in a dose dependent manner. All the crude extracts showed dose dependent antioxidant and anti-hyperglycemic activity, capable of offering protection against free radical mediated damages (Sindhe et.al., 2013).

Hypoglycemic and antihyperglycemic effect of methanolic extract of *Muntingia calabura* L. leaves was evaluated in normoglycaemic, glucose loaded and alloxan-induced (135 mg/Kg body weight) diabetic rats. The extract (500 mg/kg body weight) significantly lowered the blood glucose levels to an extent comparable to that produced by standard antidiabetic drug (Glipizide 5 mg/Kg body weight) in both normal and diabetic rats. The extract (500 mg/kg body weight) increased the glucose tolerance in glucose loaded rats. The results suggest that methanolic extract of *Muntingia calabura* L. leaves possess significant antidiabetic activity (Sridhar et.al, 2011). Triswaningsih et.al (2017) stated that *Muntingia calabura* is

particularly useful as a shade tree by the roadside. The leaves contains flavonoids, saponins, tannins and triterpen, steroid. The compounds in pharmaceuticals has a role as an antioxidant, anti diabetic, a bitter taste, antimicrobial, diuretic, etc. This research aims to determine the chemical compounds in cherry leaves that has properties as catcher free radicals. Based on analysis of GC-MS showed that volatile compounds consist of myrcene (5,93%), thymol (3,543%), α terpinol (11,831%), linalool (2,240%), geraniol (21,718%), nerol (4,375%), citronellol (12,837%), eugenol (17,498%), α Ionone (1,413%), β sitosterol (7,806%), α Amyrin (3,167%), Lupelol (4,228%), α tocopherol (1,975%), dan β carotene (1,425%). Result analysis of LC-MS showed that consist of Fumaric acid (6,643%), Succinic acid (4,903%), Niacin (0,718%), Malic acid (2,863%), Cinnamic acid (4,945%), Pyridoxine (1,893%), Gallic acid (21,428%), Ascorbic acid (6,121%), Glucose (8,166%), Fructose (20,690%), Pantothenic acid (1,478%), Biotin (1,025%), Thiamine (1,158%), Kaempferol (6,825%), Catechin (14,407%), Quercetin (10,623%), Riboflavin (1,131%) and Folic acid (1,553%).

Among the phytochemicals assessed, the carbohydrate, glycosides, tannin, phenolic compounds, proteins and aminoacids showed strong reactions, whereas, moderate reaction was observed with rest of the phytochemicals. Positive result was observed with flurosence study. The total yield obtained from 15 gm powder was 09.95% with leaf and 16.01% with fruit. The carbohydrate content was found to be higher with leaf (204.0 ± 3.46 mg/g carbohydrate) when compared to fruit (75.33 ± 4.61 mg/g carbohydrate). But, the protein content was higher with fruit extract (6.44 ± 0.15 mg/g protein) on comparison with leaf extract (2.04 ± 0.15 mg/g protein). Moderate amount of aminoacids content was observed with leaf and fruits. The behavior of the extract powder was positive for alkaloids, proteins, flavonoids, anthroquinone (Khrisnaveni and Dhanalaksmi, 2014).

Antidiabetic study showed that aqueous and methanolic extracts inhibited rat's intestine α -glucosidase activity with the IC 50

values of 1.45 ± 0.19 and 0.88 ± 0.60 mg/ml, suggesting the ability of the plant to delay glucose absorption from small intestine, hence reduce hyperglycemia. Meanwhile, the chloroform and hexane extracts possess anti-glycation activity with the IC 50 values of 1.03 and 2.38mg/ml, respectively. This observation suggests that such extracts and might have the potential to prevent the occurrence of diabetic complications. Total phenolic content in the aqueous, methanolic, chloroform and hexane extracts were 334.38 ± 3.24 , 221.67 ± 9.43 , 78.13 ± 0.88 and 44.17 ± 2.36 mg GAE/g extract, respectively. Antioxidant assay showed that aqueous and methanolic extracts possess potent reducing power and DPPH scavenging activity (IC 50 : 22.28 ± 2.20 μ g/ml and 23.28 ± 1.30 μ g/ml). These potent activities might be attributed to the amount of phenolic compounds presence in such extracts. In conclusion, *Muntingia calabura* possess antidiabetic, anti-glycation, antioxidant and mild cytotoxic activities. These results indicate that *Muntingia calabura* might have the potential to be developed as new pharmacological agent targeting on diabetes mellitus management (Adam et.al, 2015).

CONCLUSION

Plants can be used as natural antioxidants and effective herbal medicines, such as Kersen (*Muntingia calabura* L.) due to their anti-diabetic compounds, such as flavonoids, tannins, phenolic and alkaloids that improve the performance of pancreatic tissues by increasing the insulin secretion or decreasing the intestinal absorption of glucose. More researches are needed in order to separate the active components in kersen, the dose of kersen leaf extract that can be used to decrease high blood sugar level, and molecular interactions of their compounds for analysis of their curative properties.

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