

TEN COMMONLY AVAILABLE MEDICINAL PLANTS IN MALAYSIA USED FOR THE TREATMENT OF DIABETES – A REVIEW**MAHENDRAN SEKAR*, MUHAMMAD ZULHILMI BIN ABDULLAH, AHMAD YASSER HAMDI BIN NOR AZLAN, SITI NABILA BINTI NASIR, ZAHIDA BINTI ZAKARIA, MOHD SYAFIQ BIN ABDULLAH****¹Faculty of Pharmacy and Health Sciences, Universiti Kuala Lumpur, Royal College of Medicine Perak, Ipoh – 30450, Malaysia.
Email: mahendransekar@rcmp.unikl.edu.my***Received: 11 October 2013, Revised and Accepted: 6 November 2013***ABSTRACT**

Background: Diabetes mellitus is a common and serious metabolic disorder throughout the world. Search for newer drugs continues because the existing synthetic drugs have several limitations and side effects. Traditional plants have been used throughout the world for the treatment of diabetes.

Objective: The present study is an attempt to list of the commonly available medicinal plants with antidiabetic and related beneficial effects originating from different parts of Malaysia.

Method: This study was carried out for a general knowledge in which to give information on common medicinal plants in Malaysia used for the treatment of diabetes.

Results: There are 10 such very commonly available medicinal plants were found and described in this review which clearly shows the importance of herbal plants in the treatment of diabetes.

Conclusion: Only a few plants have been subjected to detailed scientific investigation. However, further pharmacological and toxicological studies at the molecular and clinical levels are still warranted to confirm the potential of these plants.

Keywords: Medicinal plants, Malaysia, Diabetes

INTRODUCTION

Herbal medicines refer to the use of whole plant remedies for the promotion of healing and maintenance of health. It is said that the idea originated in Egypt dating back to 1550 BC though, it is known that man has been using plant food since time immemorial, yet their identity, purity and efficacy in terms of pharmacological effect, collectively termed as quality have always been argued. Out of the estimated 8,00,000 plant species on Earth, about a quarter of the plants have been categorized and only small percent of these plants have been examined for phytochemical characterization and pharmacological efficacy while the rest remains largely unexplored [1].

The overall national prevalence of diabetes and impaired fasting glucose among Malaysians aged 30 years and above had increased from 8.3% in 1996 to 14.9% in 2006. There was an increase in the percentage of known diabetes from 6.5% to 9.5% and a three-fold increase in the newly diagnosed diabetes from 1.8% to 5.4% was also noted in the same period [2]. The odds of having diabetes increase with increasing age, positive family history of diabetes mellitus, increasing BMI, and lower levels of education. There is no significant difference in the prevalence of diabetes among males and females in Malaysia. The percentage of people with known diabetes using traditional or alternative medicine is below 1% in Malaysia. The International Diabetes Federation has estimated that adjusted prevalence (adjusted to world population) of diabetes mellitus in Malaysia will rise from 11.6% in 2010 to 13.8% in 2030. Several indigenous medicinal plants are employed in the traditional management of diabetes mellitus but there is a need to conduct phytochemical and pharmacological studies to ascertain their therapeutic values [2].

In Malaysia, the traditional practitioners use medicinal plants and plant juices to cure diabetes and this practice is still in use [3]. Traditional plants or herbs are widely have been used for cure

diabetes. There are several herbs or medicinal plants that already been known can help to cure and control diabetes. They are preferable than synthetic antidiabetic agents for reasons they are more cheap, more effective and cause less side effects. A lot of study have been made and the searching of new drugs still continue until now to replace the synthetic drugs which have limitation and less effective. Unfortunately, some herbal drugs which have antidiabetic activity are not yet to be commercially as modern drugs. As increase of patients daily and highly demand on herbal drugs and traditional plants in which have antidiabetic activity, study and research are enormously taking place. Hence, in the present study was carried out to collect information on commonly available medicinal plants in Malaysia in order to treat diabetes.

MATERIAL AND METHODS

This study was carried out for a general knowledge in which to give information on common medicinal plants in Malaysia used for the treatment of diabetes. Since Malaysia is rich with varieties of medicinal plants to treat diabetes that have not been discovered yet such as Ulam Raja, Misai Kucing and others. Therefore, by doing this basic research we found that we can encourage more researchers to explore more medicinal plants that can treat diabetes. The government reserve forests are seen in Hutan Belum, Endau Rompin and others where all of this forest is known as tropical rainforest. This type of forest usually rich with plenty of plant species which can treat many diseases.

ETHNOBOTANICAL STUDY

A study has done to obtain ethno medical information by carried out a survey in entire Malaysia. The data includes local name of the plants, scientific name and the parts of the plant used. These plants identified based on their vernacular names, help of traditional healers, herbalist and rural dwellers.

RESULTS

Table 1: Common Medicinal Plants in Malaysia used for the treatment of diabetes

S.No	Common Name	Vernacular name of plants	Botanical name	Family	Parts used for medicinal purpose
1	Hempedu Bumi	Kalmegh	<i>Andrographis paniculata</i>	Acanthaceae	Leaves
2	Sambung Nyawa	Akar Sebiak	<i>Gynura procumbens</i>	Asteraceae	Leaves
3	Mas Cotek	Kangkalibang	<i>Ficus deltoidea</i>	Moraceae	Leaves and Roots
4	Ulam Raja	Pokok Kenikir	<i>Cosmos caudatus</i>	Asteraceae	Flowers and Leaves
5	Dukung Anak	Kelek Anak	<i>Phyllanthus niruri</i>	Euphorbiaceae	Leaves
6	Pokok Gajus	Jambu Golok	<i>Anacardium occidentale</i>	Anacardiaceae	Seeds
7	Belimbing Buluh	Belimbing Asam	<i>Averrhoa bilimbi</i>	Oxalidaceae	Fruits
8	Pokok Bunga Raya	Kembang Sepatu	<i>Hibiscus rosa-sinensis</i>	Malvaceae	Flowers
9	Misai Kucing	Kumis Kucing	<i>Orthosiphon stamineus</i>	Lamiaceae	Leaves
10	Sireh	Sireh	<i>Piper sarmentosum</i>	Piperaceae	Leaves



Fig 1: *Andrographis paniculata*



Fig 2: *Gynura procumbens*



Fig 3: *Ficus deltoidea*



Fig 4: *Cosmos caudatus*



Fig 5: *Phyllanthus niruri*



Fig 6: *Anacardium occidentale*

***Andrographis paniculata* [Fig.1]**

It is an herbaceous plant belongs to the family Acanthaceae, native to India and Sri Lanka. It is widely cultivated in Southern and Southeastern Asia, where it is used to treat infections and some diseases, often being used before antibiotics were created. Mostly the leaves and roots were used for medicinal purposes.

The ethanol extract of *A. paniculata* possesses antidiabetic property. Its anti-diabetic effect may be attributed at least in part to increased glucose metabolism. Its hypotriglyceridemic effect is also beneficial in the diabetic state.

Good glycemic control and/or use of antioxidants may play an important role in the prevention of complications associated with diabetes. Elevation of blood glucose levels, decrease in the

superoxide dismutase and catalase activity were resulted against STZ induced diabetic rats [4].

***Gynura procumbens* [Fig.2]**

This plant is a vine found in Malaysia, Thailand, and Indo-China. Leaves are ovate-elliptic or lanceolate, 3.5 to 8 cm long, and 0.8 to 3.5 cm wide. Flowering heads are paniced, narrow, yellow, and 1 to 1.5 cm long.

A study on the antidiabetic activity of *G. procumbens* used in the traditional management of diabetes in Southern Asia has been done. *G. procumbens* contains antidiabetic principles, most extracted in 25% ethanol. Interaction among active components appears to determine the antidiabetic efficacy, achieved likely by a metformin-like mechanism.

The ethanolic extract of leaves of *Gynura procumbens*, at single doses of 50, 150 and 300 mg/kg orally, significantly suppressed the elevated serum glucose levels in diabetic rats. *G. procumbens* contains antidiabetic principles, most extracted in 25% ethanol. Interaction among active components appears to



Fig 7: *Averrhoa bilimbi*



Fig 8: *Hibiscus rosasinensis*



Fig 9: *Orthosiphon stamineus*



Fig 10: *Piper sarmentosum*

***Ficus deltoidea* [Fig.3]**

A small perennial herb, growing up to about 2 m tall. The different shapes of the leaves represent different varieties some having a rounded shape and others having an elongated egg shape. The colour at the top of the leaf is shining green while underneath, the surface colour is golden yellow with black spots in between the leaf veins. This plant species are male and female. The leaves of female species are big and round in shape, while the male species are small, round and long in shape.

The leaf extracts of *F. deltoidea* may have positive effects on glucose and lipid levels and are safe for use in human. *F. deltoidea* leaf extract had no effect on glycemia variables but both total and LDL cholesterol concentrations were significantly decreased in this group in order to treat diabetes.

The antioxidant activities of the fruits of *F. deltoidea* might be asserted by the phenolic content but other polar plant components were possibly involved in the antidiabetic properties. The study of these compounds having both antihyperglycemic and antioxidant activities may provide a new approach in the treatment of diabetes mellitus [7].

Extracts of dried powdered leaves were obtained using methanol solution, n-hexane, chloroform, and n-butanol. These extracts were orally administered to rodents. Methanol extract exhibited blood glucose lowering activity in mildly insulin resistant diabetic rats as well as in normoglycemic mice unlike hydrophilic butanol subextract which only expressed its activity in normoglycemic mice [8].

***Cosmos caudatus* [Fig.4]**

It is an annual plant in Cosmos genus, bearing purple, pink, or white ray florets, and capable of being found worldwide in tropical areas. The plant is edible and its common names include ulam raja, literally meaning "the King's salad". It was brought by the Spaniards from Latin America, via the Philippines, to the rest of Southeast Asia. Ulam, a Malay word used to describe a preparation that

determine the antidiabetic efficacy, achieved likely by a metformin-like mechanism [6].

combines food, medicine and beauty is the widely popular Malay herbal salad.

The leaves have been used traditionally to treat cancer, diabetes sweet and stones and also as a diuretic. *C. caudatus* was found to have a good inhibitory profile against carbohydrate modulating enzymes such as α -glucosidase, which are related to glucose absorption in the intestine [9]. Its leaves when used in a diet are potentially useful to manage the glucose induced hyperglycemia and hypertension-induced vascular complications [9].

***Phyllanthus niruri* [Fig.5]**

This tropical plant easily found in Malaysia. Pokok Dukung Anak is a tree commonly grown herbs and surrounding area home. Support Tree children are also used as herbal medicine for the treatment of diabetes and heart related diseases. Dukung Anak tree is a small seasonal herb, grows up to 50-70 cm high. Dukung Anak tree leaves are green arranged alternately measuring 6-10 mm. However, there is no leaf stalk stalk of green compound leaves. Dukung Anak stems smooth green, grows straight and branched open. Support flowers appear solitary child under the leaves. Triangular-shaped bract, bract scales and each holds a flower.

The methanol extract lowered blood glucose, suppressed postprandial rise in blood glucose following a glucose meal, reduced haemoglobin glycation and increased absolute and relative weights as well as glycogen content of liver in diabetic rats. These findings suggest that aerial parts of *P. niruri* may owe their blood glucose lowering properties to inhibition of glucose absorption and enhancement of glucose storage [10].

***Anacardium occidentale* [Fig.6]**

Originally native to North eastern Brazil, it is now widely grown in tropical climates for its cashew apples and nuts. The name *Anacardium* actually refers to the shape of the fruit, which looks like an inverted heart (ana means "upwards" and -cardium means "heart"). Cashew seed extract have found that it can stimulate muscle absorption of glucose needed for energy, making the seed potentially useful for the treatment of diabetes. Because other parts of the cashew plant had no such effect, it seems that

cashew seed extract likely contains active compounds, which may have potential anti-diabetic properties.

A. occidentale stem-bark aqueous and methanolic extracts significantly reduced the mean basal blood glucose concentrations of fasted normal and fasted diabetic rats. The hypoglycemic effect of the methanolic plant extract was found to be slightly more pronounced than that of the aqueous plant extract in both the normal and diabetic rats examined [11].

***Averrhoa bilimbi* [Fig.7]**

It is commonly known as bilimbi, cucumber tree, or tree sorrelis a fruit-bearing tree of the genus *Averrhoa*, family Oxalidaceae. It is a close relative of carambola tree. Possibly originated in Moluccas, Indonesia, the species are now cultivated and found throughout the Philippines, Indonesia, Srilanka, Bangladesh, Myanmar (Burma) and Malaysia. It is also common in other Southeast Asian countries. In India, where it is usually found in gardens, the bilimbi has gone wild in the warmest regions of the country.

To investigate the effect of long term administration of the hypoglycemic fractions, diabetic animals were treated with vehicle (distilled water), aqueous fraction (125 mg/kg), or butanol fraction (125 mg/kg), twice a day for 14 days. The hepatic glycogen content was significantly higher in aqueous fraction treated rats when compared to diabetic control; however no change was found in the butanol fraction treated rats. Hence, aqueous fraction is a potential source for the isolation of active principle(s) for oral anti-diabetic therapy [12].

***Hibiscus rosa-sinensis* [Fig.8]**

This plant is an evergreen flowering shrub grows up to 4.7 meter tall, native to East Asia. It is widely grown as an ornamental plant throughout the tropics and subtropics. The powder of the flower is used for the control of the blood glucose level.

Blood glucose and total lipid levels were determined in streptozotocin induced diabetic rats after oral administration of an ethanol flower extract of *Hibiscus rosa-sinensis*. The extract lowered the total cholesterol and serum triglycerides by 22 and 30%, respectively and increase in HDL-cholesterol (12%). The hypoglycemic activity of this extract is comparable to that of glibenclamide but is not mediated through insulin release. Other possible mechanisms are discussed [13].

***Orthosiphon stamineus* [Fig.9]**

This medicinal plant native to South East Asia and some parts of tropical Australia. It is an herbaceous shrub which grows to a height of 1.5 meters. *Orthosiphon* is a popular garden plant because of its unique flower, which is white and bluish with filaments resembling a cat's whiskers. In the wild, the plant can be seen growing in the forests and along roadsides.

Common names in Southeast Asia are Misai Kucing (Malaysia), Kumis Kucing and Remujung (Indonesia), and Yaa Nuat Mao (Thailand). The scientific names are *Orthosiphon stamineus*, *Ocimum aristatum* and *Orthosiphon aristatus*. The leaves is used to treat diabetes. Alpha-glucosidase and α -amylase inhibition could the mechanisms through which the 50% ethanolic extract of *O. stamineus* and *sinensetin* exert their antidiabetic activity, indicating that it could have potential use in the management of non-insulin-dependent diabetes [14].

***Piper sarmentosum* [Fig.10]**

It is a plant commonly used in many Southeast Asian cuisines. The leaves are often confused with betel, but they lack the intense taste of the betel leaves and are significantly smaller. *P. sarmentosum* is found from the tropical areas of Southeast Asia, Northeast India and South China, and as far as the Andaman Islands. *P. sarmentosum* have been reported to possess varying degree of hypoglycemic, antidiabetic and other additional properties. The antioxidant properties of the herbs may be effective in controlling the oxidative damage produced during diabetes mellitus [15].

CONCLUSION

The survey conducted in Malaysia showed that there are many medicinal plants used by the people to cure diabetes. Ten very commonly available medicinal plants in Malaysia were recognized contain hypoglycemic agents which can treat diabetes. In our survey, we found out that there are different parts of plants which can cure diabetes (flower, fruit, leaf, and seed). The antidiabetic effect is exactly the same in some plants because of their chemical properties. Only a few plants have been subjected to detailed scientific investigation. However, further pharmacological and toxicological studies at the molecular and clinical levels are still warranted to confirm the potential of these plants.

REFERENCES

1. Jantan I. Medicinal plant research in Malaysia: Scientific interests and advances. *J Sains Kesihatan Malaysia* 2004;2:27-46.
2. Rampal L, Loong YY, Azhar MZ, Sanjay R. Enhancing Diabetic Care in the Community in Malaysia: Need for a Paradigm Shift. *Malaysian J Med Health Sci* 2010;6:3-11.
3. Samuel SJ, Kalusalingam A, Chellappan DK, Gopinath R, Radhamani S, Husain HA, Muruganandham V, Promwicht P. Ethnomedical survey of plants used by the Orang Asli in Kampung Bawong, Perak, West Malaysia. *J Ethnobiol Ethnomed* 2010;6:5-10.
4. Dandu AM, Inamdar NM. Evaluation of beneficial effects of antioxidant properties of aqueous leaf extract of *Andrographis paniculata* in STZ-induced diabetes. *Pakistan J Pharm Sci* 2009;22:49-52.
5. Zhang XF, Tan BK. Effects of an ethanolic extract of *Gynura procumbens* on serum glucose, cholesterol and triglyceride levels in normal and streptozotocin-induced diabetic rats. *Singapore Med J* 2000;41:9-13.
6. Algariri K, Meng KY, Atangwho IJ, Asmawi MZ, Sadikun A, Murugaiyah V, Ismail N, Eteng MU. Hypoglycemic and anti-hyperglycemic study of *Gynura procumbens* leaf extracts. *Asian Pac J Trop Biomed* 2013;3:358-66.
7. Misbah H, Aziz AA, Aminudin N. Antidiabetic and antioxidant properties of *Ficus deltoidea* fruit extracts and fractions. *BMC Complemen Altern Med* 2013 May 29;13:118. doi: 10.1186/1472-6882-13-118.
8. Ilyanie Y, Wong TW, Choo CY. Evaluation of hypoglycemic activity and toxicity profiles of the leaves of *Ficus deltoidea* in rodents. *J Complemen Integ Med* 2011 Jan;8. doi: 10.2202/1553-3840.1469.
9. Loh SP, Hadira O. *In vitro* inhibitory potential of selected Malaysian plants against key enzymes involved in hyperglycemia and hypertension. *Malaysia J Nutri* 2011;17:77-86.
10. Okoli CO, Obidike IC, Ezike AC, Akah PA, Salawu OA. Studies on the possible mechanisms of antidiabetic activity of extract of aerial parts of *Phyllanthus niruri*. *Pharm Biol* 2011 Mar;49(3):248-55. doi: 10.3109/13880209.2010.501456.
11. Ojewole JA. Laboratory evaluation of the hypoglycemic effect of *Anacardium occidentale* Linn (Anacardiaceae) stem-bark extracts in rats. *Exp Clin Pharmacol* 2003;25:199-204.
12. Tan BK, Tan CH, Pushparaj PN. Anti-diabetic activity of the semi-purified fractions of *Averrhoa bilimbi* in high fat diet fed-streptozotocin-induced diabetic rats. *Life Sci* 2005;76:2827-39.
13. Sachema A, Khemani LD. Effect of *Hibiscus rosasinensis* Linn. ethanol flower extract on blood glucose and lipid profile in streptozotocin induced diabetes in rats. *J Ethnopharmacol* 2003;89:61-6.

14. Mohamed EA, Siddiqui MJ, Ang LF, Sadikun A, Chan SH, Tan SC, Asmawi MZ, Yam MF. Potent α -glucosidase and α -amylase inhibitory activities of standardized 50% ethanolic extracts and sinensetin from *Orthosiphon stamineus* Benth as antidiabetic mechanism. *BMC Comple Alter Med* 2012 Oct 8;12:176. doi: 10.1186/1472-6882-12-176.
15. Zar CT, Teoh SL, Das S, Zaiton Z, Fariyah HS. Use *Piper sarmentosum* as an effective antidiabetic supplement in South East Asia: a review. *Clin Therapeutica* 2012;163:505-10.