Anti-Diabetic Medicinal Plants Used For Diabetes Mellitus: An Overview

I.Deepak[1], Dr. S. Swarnalatha[2] , Ms.M.Suganya[3]
[1, 2, 3] Dept of Pharmacology
[1, 2, 3] Pallavan Pharmacy College, Kolivakkam, Iyyengarkulam,
Kanchipuram-631 502.

Abstract- *The current study's goal is to evaluate various medicinal plants used for anti-diabetic activity. Diabetes is one of the most common non-communicable diseases worldwide. It is the fourth leading cause of death in the most developed countries, and it has been widely reported that it is epidemic in many developing and newly industrialized countries. This poses a serious threat that must be addressed within the twenty-first century. Plants have been used as a source of medicine since antiquity. Plants were mentioned in Ayurveda and other Indian literature as being used in the treatment of various ailments. Less than 1% of an estimated 250 000 higher plants have been screened pharmacologically, with very few in relation to diabetes mellitus. Systematic research on folklore medicinal plants that combat diabetes mellitus is being conducted.*

Keywords- Diabetes mellitus, Ayurveda, Medicinal plants, Hypoglycemic.

I. INTRODUCTION

Both people in industrialized and developing nations are susceptible to the condition known as diabetes mellitus. According to estimates, 25% of this condition affects the entire world's population. Diabetes Mellitus is brought on by a carbohydrate anomaly. Metabolism, which is connected to low levels of blood insulin or insulin resistance in the target organs [1]. Despite significant advancements in the management of diabetes by oral hypoglycemic medicines looking ok for newer medication continuing due to the availability of synthetic drug and several restrictions. Natural medications with antidiabetic activity have not yet been marketed as modern even though they have received praise for the, drugs they use in therapy. Obese people are more likely to develop type 2 diabetes, which is also linked to hypertension and dyslipidemia. Thus, the goal of the therapy is to lessen insulin resistance and increase insulin secretion. Diabetes is a metabolic illness in which the body does not effectively make or use the hormone insulin, which is needed to turn sugar, carbohydrates, and other foods into energy. The hallmark of diabetes mellitus is persistently high blood glucose levels (sugar). The human body must keep blood glucose levels at a very strict small range, which is accomplished with glucagon and insulin. Glucagon has the effect of stimulating the liver to release glucose from its cells into the blood so that it can be used to produce energy. Low rates of glucose absorption into muscles and adipose tissue as a result of type 1 diabetes inability to release insulin[3]. In developing nations where the expense of conventional medications is a burden on the populace, traditional medicine (herbal) is utilized to treat diabetes[4]. Despite the development of both natural and synthetic hypoglycemic medicines, diabetes and its related consequences remain a serious medical issue. It has been discovered that many native Indian medicinal plants can help people manage their diabetes. Among the many benefits ofusing medicinal plants is that they discovered to be helpful in effectively managing diabetes. One of the many benefits ofthe fact is that these are widely accessible andhave hardly any negative effects. Historically, plants have been anOutstanding source of medications, and many of the current direct or indirect sources of all medications currently on the marketby them.According to the ethnobotanical data, 800plants have the promise to treat diabetes[5]. SeveralWhen tested, herbs displayed antidiabetic activity. Utilizingexperimental methods that are now accessible [6]. This review article lists some medicinal plants with anti-diabetic properties and explains how they work, including Brassica juncea (B. juncea), Combretum micranthum (C. micranthum), Elephantopusscaber (E. scaber), Gymnemasylvestre (G. Sylvestre), Liriope spicata (L. spicata), and Parinariexcelsa (P. excelsa).

II. ANTIDIABETIC ACTIVITY OF FOLKLORE MEDICINAL PLANTS

1. Brassica juncea

In Tamil Nādu, it is a widely used spice in a variety of foods. The Cruciferae family includes the traditional medicine plant B. juncea. In STZ-induced diabetic male albino rats, the strong hypoglycemic effect of B. juncea aqueous seed extract was studied. There have been reports of doses with hypoglycemic activity of 250, 350, and 450 mg/kg[7].

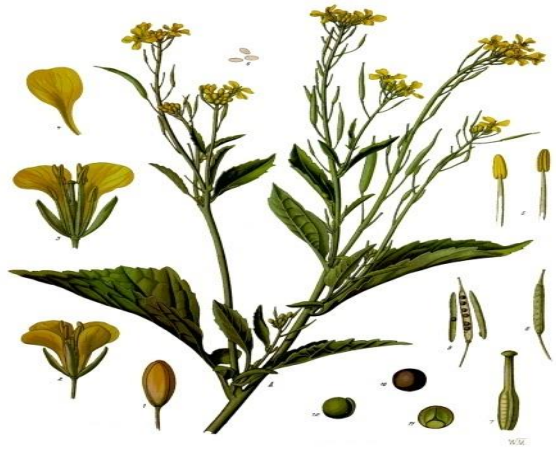

Fig 1:

2. Eugenia jambolana

Ayurveda, a traditional Indian medical system, recommends Eugenia jambolana (E. jambolana), often known as Jamun or Indian blackberry, for treatment in DM. E. jambolana has been noted to exhibit hypoglycemic effects in both laboratory models and clinical trials, in line with its purported anti-diabetic benefit in traditional medicine[8].

Fig 2:

3. Coccina grandis

Alcoholic extracts of the leaves of Coccinia grandis (C. grandis) were tested for hypoglycemic action. Mice received an oral injection of a 600 mg/kg bw alcoholic extract. In normal fasting rats, oral treatment of an alcoholic extract of C. grandis leaves resulted in a considerable hypoglycemic effect[9].

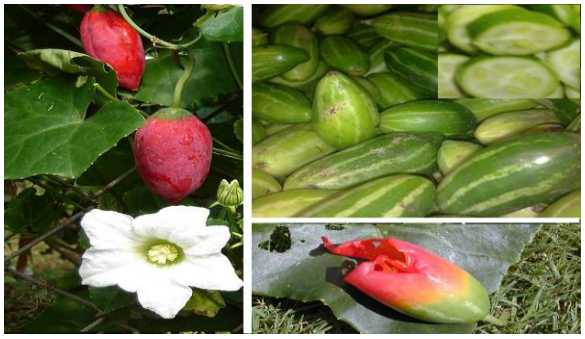

Fig 3

4. Alangiumlamarckii

Alangiumlamarckii alcohol extract's anti-diabetic effects (A. lamarckii). For these investigations, alcoholic leaf extract of 250 and 500 mg/kg body weight was used. In STZnicotinamide-induced diabetic rats, A. Lamarckian significantly reduced blood sugar levels[10].

Fig 4:

5. Albizia odoratissima

Effect of Albizia odoratissima (A. odoratissima) methanolic bark extract on the prevention of diabetes in alloxan-induced diabetic mice. The animals were given methanolic extracts at doses of 250 and 500 mg/kg body weight. In alloxan-induced albino mice, serum levels of triglycerides, SGOT, SGPT, alkaline phosphatase, and total proteins were significantly reduced[11].

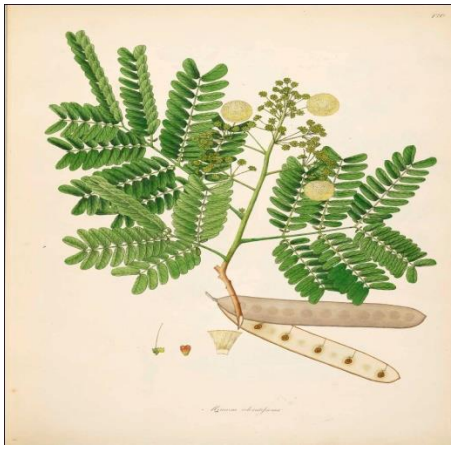

Fig 5:

6. Artemis sphaerocephalaKrasch

Artemis sphaerocephala (A. sphaerocephala) gum has antioxidant effects on STZ-induced diabetic rats. The serum and liver tissue concentrations of +OH and TBARS (thiobarbituric acid reactive compounds) were elevated in STZ-induced rats. Liver and serum superoxide dismutase activity levels were lowered. The concentrations of TBARS and +OH in serum and liver tissue decreased following treatment of A. 0in serum and hepatic SOD levels. An excellent antioxidant is A. sphaerocephala[12].

7. Axonopuscompressus

The plant's methanolic leaf extract has anti-diabetic properties. Alloxan was injected into the rats to cause diabetes. For these trials, 250, 500, and 1000 mg/kg bw of methanolic leaf extract were used. When compared to the control group, Axonopuscompressus (A. compressus) methanolic leaf extract at all doses (250, 500, and 1000 mg/kg) significantly reduced the blood glucose levels in diabetic rats by 31.5%, 19.8%, and 24.5%, respectively. A. compressus might have excellent anti-diabetic properties[13].

Fig 6:

8. Berberis vulgaris

Berberis vulgaris (B. vulgaris) L.'s hypoglycemic effects in diabetic rats produced by streptozotocin B. vulgaris is a member of the Berberidaceae family and is used traditionally as medicine. The findings showed that saponins and water extract have a substantial hypoglycemic effect. The levels of blood lipids and cholesterol both considerably rose[14].

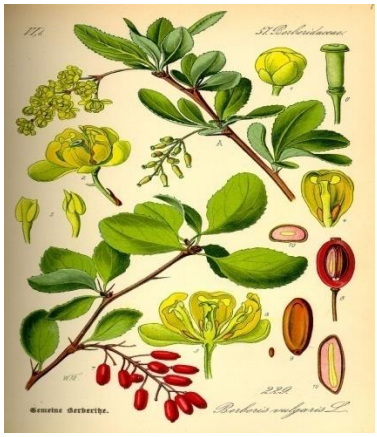

Fig 7:

9. Caesalpinia digyna

Bergenin from the roots of Caesalpinia digyna has an anti-diabetic action (C. digyna). When compared to control rats, diabetic rats had significantly higher plasma total cholesterol (TC), triglycerides (TG), and LDL cholesterol levels, whereas HDL cholesterol levels had significantly lower values. Bergenin (10 mg/kg; p.o.) administration resulted in a considerably higher lipid profile when compared to glibenclamide (10 mg/kg; p.o.). Antioxidant enzymes like SOD and Cat showed a decline in activity. Comparing diabetic rats to control rats, the amount of TBARS was considerably higher in the diabetic rats. Bergenin (10 mg/kg; p.o.) injection significantly enhanced SOD and CAT levels and decreased TBARS levels. The anti-diabetic activities of bergenin are excellent[15].

Fig 8:

10. Catharanthus roseus

The methanolic leaf extract of Catharanthus roseus (C. roseus) has a hypoglycemic effect in diabetic rats produced by alloxan. When compared to the Control rat, the blood glucose levels considerably dropped. Compared to Glibenclamide and Metformin, the methanolic extract of C. roseus had a more dramatic effect on lowering blood sugar levels[16].

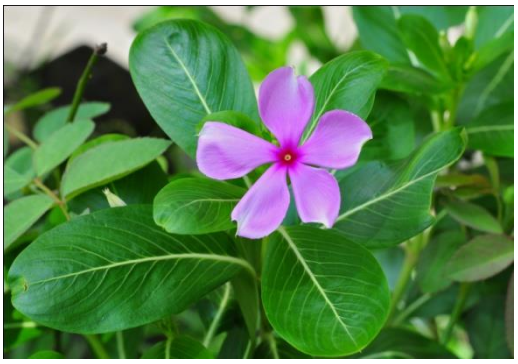

Fig 9:

11. Centaurium erythrea

A single intraperitoneal dosage of STZ (65 mg/kg) was used to cause diabetes. MDA in the tissue was used to gauge the oxidative stress. Estimating pancreatic antioxidant enzymes like glutathione peroxidase, catalase, and superoxide dismutase (GPx). When diabetic rats were treated, there was a noticeable decrease in the levels of pancreas tissue TBARS compared to normal animals. The SOD, CAT, GPx, and GST pancreatic antioxidant defence enzyme activity levels were significantly higher in the diabetic-treated rats. Effect of antioxidants in Centaurium erythrea (C. erythrea) aqueous leaf extract[17].

Fig 10:

12. Chaenomeles sinensis

Fruits from Chaenomeles sinensis (C. sinensis) (Thouin) Koehne have excellent anti-diabetic effects when extracted with ethyl acetate. Chaenomeles sinensis is a member of the Rosaceae family. Anti-diabetic doses of 50 and 100 mg/kg body weight have been reported[18].

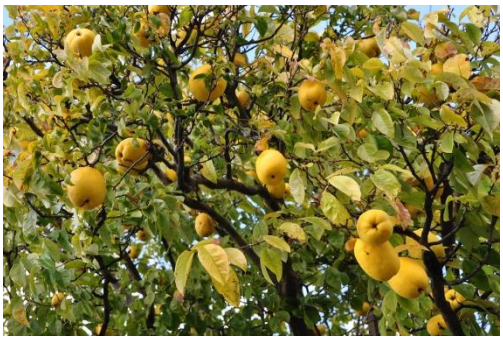

Fig 11:

III. CONCLUSION

Folklore medicinal plants for the treatment of diabetes mellitus were discussed in this review. Because there are so many therapeutic plants to choose from in rural areas, folklore medicines are frequently employed there. Therefore, it seems highly appealing to treat diabetes mellitus with chemicals derived from plants that are available and do not require time-consuming pharmaceutical manufacturing. An effort has been made to research antidiabetic medicinal plants in the current review, which may be helpful to health professionals, researchers, and academics working in the fields of pharmacology and therapeutics to produce antidiabetic medications.

AN INTREST DISCLOUSER DECLARATION

We certify that we don't have any competing interests.

REFERENCES

[1] Maiti R, Jana D, Das UK, Ghosh D. Antidiabetic effect of aqueous extract of seed of Tamarindus indica in streptozotocin induced diabetic rats. J Ethnopharmaco2004; 92: 85-91.
[2] Wadkar KA, Magdum CS, Patil SS, NaikwadeNS.Antidiabetic potential and Indian medicinal plants. J HerbalMed Toxicol2008; 2: 45-50.
[3] AL Lehninger, DL Nelson, MM Cox. Principle ofBiochemistry. New York: Worth Publishers; 2010.
[4] Saravanan G, Pari L. Hypoglycaemic and antihyperglycaemiceffect of Syzygiumcuminibark in streptozotocin-induceddiabetic rats. J PharmacolToxicol2008; 3: 1-10.
[5] Alarcon-Aguilara FJ, Roman-Ramos R, Perez-Gutierrez S,Aguilar-Contreras A, Contreras-Weber CC, Flores-

SaenzJL. Study of the anti-hyperglycemic effect of plants used asantidiabetics. J Ethnopharmacol1998; 61: 101-110.

[6] Jafri MA, Aslam M, Javed K, Singh S. Effect of PunicagranatumLinn (flowers) on blood glucose level in normal andalloxan-induced diabetic rats. J Ethnopharmacol2000; 70:309-314.

[7] Thirumalai T, Therasa VS, Elumalai EK, David E.Hypoglycemic effect of Brassica juncea(seeds) onstreptozotocin induced diabetic male albino rat. Asian Pac JTrop Biomed 2011; 4: 323-325.

[8] Ravi K, Ramachandran B, Subramanian S. Effect of EugeniaJambolanaseed kernel on antioxidant defense system instreptozotocin induced diabetes in rats. Life Sci 2004; 75(22): 2717-2731.

[9] Ajay SS. Hypoglycemic activity of Coccinia indica(Cucurbitaceae) leaves. Int J Pharm Tech Res 2009; 1(3):892-893.

[10] Rajesh Kumar, Dinesh Kumar Pate, Satyendra Kuldip Prasad, Kirshnamurthy Sairam, Siva Hemalatha. Antidiabetic activityof alcoholic leaves extract of AlangiumlamarckiiThwaites on streptozotocin-nicotinamide induced type 2 diabetic rats. Asian Pac J Tropical Med 2011; 904-909.

[11] Dinesh Kumar, Sunil Kumar, Sonia Kohli, Renu Arya, JyotiGupta. Antidiabetic activity of methanolic bark extract of Albizia odoratissimaBenth. in alloxan induced diabetic albino mice. Asian Pac J Trop Med 2011; 900-903.

[12] Xin-Zhong Hu, Xiao-Hui Xing, Zheng-Mao Zhang, Rui-QinWu, Qingbin Guo, Steve W. Cui, et al. Antioxidant effectsof Artemis sphaerocephalaKrasch. gum, on streptozotocin induced type 2 diabetic rats. Food Hydrocolloids 2011; 25:207-213.

[13] Ibeh BO, Ezeaja MI. Preliminary study of antidiabeticactivity of the methanolic leaf extract of Axonopuscompressus(P.Beauv) in alloxan induced diabetic rats. J Ethnopharmacol2011; 138: 713-716.

[14] Meliani N, Amine Dib ME, Allali H, Tabti B. Hypoglycaemiceffect of Berberis vulgaris L. in normal and streptozotocininduced diabetic rats. Asian Pac J Trop Biomed 2011; 6:468-471.

[15] Kumar R, Patel DK, Prasad SK, Laloo D, Krishnamurthy S,Hemalatha S. Type 2 antidiabetic activity of bergenin fromthe roots of Caesalpinia digynaRottler. Fitoterpia2012;83(2): 395-401.

[16] Ohadoma SC, Michael HU. Effects of co-administrationof methanol leaf extract of Catharanthus roseus on thehypoglycemic activity of metformin and glibenclamide in rats. Asian Pac J Trop Med 2011; 475-477.

[17] Sefi M, Fetoui H, Lachkar N, Tahraoui A, Lyoussi B,Boudawara T, et al. Centaurium erythrea(Gentianaceae) leafextract alleviates streptozotocin-induced oxidative stress and毬- cell damage in rat pancreas. J Ethnopharmacol2011; 135: 243-250.

[18] Sancheti S, Sancheti S, Seo SY. Antidiabetic andantiacetylcholinesterase effects of ethyl acetate fractionof Chaenomeles sinensis (Thouin) Koehne fruits instreptozotocin-induced diabetic rats. Exp Toxicol Pathol2011; 65(1-2): 55-60.

[19] Kumar D, Kumar S, kohli S, Arya R, Gupta J. Antidiabeticactivity of methanolic bark extract of Albizia odoratissimaBenth in alloxan induced diabetic albino mice. Asian Pac J200 G Arumugam et al./ Journal of Acute Disease (2013)196-200Trop Med 2011; 4: 900-903.

[20] Naskar S, Mazumder UK, Pramanik G, Gupta M, SureshKumarRB, Bala A, et al. Evaluation of antihyperglycemic activity of Cocos nucifera Linn.on streptozotocin induced type 2 diabetic rats. J Ethnopharmacol2011; 138: 769-773.

[21] Eliza J, Diasy P, Ignacimuthu S, Duraipandiyan V.Antidiabetic and antilipidemic effect of eremanthin from Costusspecious (Koen.)Sm., in STZ-induced diabetic rats. Chem Biol Interact 2009; 182: 67-72.

[22] Li S, Li J, Guan XL, Li J, Deng SP, Li LQ, et al.Hypoglycemic effects and constituents of the barks of Cyclocaryapaliurusand their inhibiting activities toglucosidase and glycogen phosphorylase. Fitoterapia2011; 82: 1081-1085.

[23] Kumar S, Kumar V, Om Prakash. Antidiabetic, hypolipidemicand histopathological analysis of Dillenia indica (L.) leavesextract on alloxan induced diabetic rats. Asian Pac J TropMed2011; 347-352.

[24] Mahendran S, Badami S, Maithili V. Evaluation ofantidiabetic effect of embelin from Embeliaribesin alloxaninduced diabetes in rats. Biomed Preventive Nutr2011; 1:25-31.

[25] Patel DK, Kumar R, Prasad SK, Sairam K, Hemalatha S.Antidiabetic and in vitro antioxidant potential of Hybanthusenneaspermus(Linn) F. Muell in streptozotocin-induceddiabetic rats. Asian Pac J Trop Med 2011; 4: 316-322.

[26] Balamurugan R, Ignacimuthu S. Antidiabetic andhypolipidemic effect of methanol extract of LippianodifloraL. in STZ induced diabetic rats. Asian Pac J Trop Biomed2011; 1: S30-36.

[27] Hou SZ, Chen SX, Huang S, Jiang DX, Zhou CJ, Chen CQ,et al. The hypoglycemic activity of LithocarpuspolystachyusRehd. leaves in the experimental hyperglycemic rats. JEthnopharmacol2011; 138: 142-149.

[28] Elberry AA, Harraz FM, Ghareib SA, Gabr SA, NagyAA, Sattar EA. Methanolic extract of Marrubiumvulgareameliorates hyperglycemia and

dyslipidemia instreptozotocin-induced diabetic rats. Int J Diabetes Mellitus(2011). In press.

[29] Patil R, Patil R, Ahirwar B, Ahirwar D. Isolation andcharacterization of anti-diabetic component (bioactivityguided fractionation) from Ocimum sanctum L. (Lamiaceae)aerial part. Asian Pac J Trop Med 2011; 278-282.

[30] Cetto AA, Wiedenfeld H. Anti-hyperglycemic effect of Opuntia streptacanthaLem. J Ethnopharmacol2011; 133:940-943.

[31] Huang CS, Yin MC, Chiu LC. Antihyperglycemic andantioxidative potential of Psidium guajava fruit instreptozotocin-induced diabetic rats. Food Chem Toxicol2011; 41: 2189-2195.

[32] Hedayathullah Khan HB, Vinayagam KS, PalaniveluS, Panchanatham S. Anti-diabetic effect of SemecarpusanacardiumLinn nut milk extract in a high fat diet STZinducedtype 2 diabetic rat model. Comp Clin Pathol2012; 21(6): 1395-1400.

[33] Georgea C, Lochnera A, Huisamen B. The efficacy of Prosopisglandulosaas antidiabetic treatment in rat models of diabetesand insulin resistance. J Ethnopharmacol2011; 137: 298-304.

[34] Chen X, Jin J, Tang J, Wang Z, Wanga J, Jin L, et al.Extraction, purification, characterization and hypoglycemicactivity of a polysaccharide isolated from the root of Ophiopogon japonicas. Carbohydrate Polymers 2011; 83:749-754.

[35] Sireesh Y, Kasetti RB, Nabi SA, Swapna S, ApparaoC.Antihyperglycemic and hypolipidemic activities of Setariaitalicaseeds in STZ diabetic rats. Pathophysiology 2011; 18:159-164.

[36] Gandhi GR, Ignacimuthu S, Paulraj MG, Sasikumar P.Antihyperglycemic activity and antidiabetic effect of methylcaffeate isolated from Solanum torvumSwartz. Fruitinstreptozotocin induced diabetic rats. Eur J Pharmacol2011;670: 623-631.

[37] Gupta S, Sharma SB, Singh UR, Bansal SK. Salutary effectof Cassia auriculata L. leaves on hyperglycemia-inducedatherosclerotic environment in streptozotocin rats. CardiovascToxicol2011; 11: 308-315.

[38] Ghoul JE, Boughanmi NG, Attia MB. Biochemical studyon the protective effect of ethanolic extract of Zygophyllumalbumon streptozotocin induced oxidative stress and toxicityin mice. Biomed Preventive Nutr2011; 1(2): 79-83.

[39] Sundaram R, Naresh R, Shanthi P, SachdanandamP.Antihyperglycemic effect of iridoid glucoside, isolated from the leaves of Vitex negundo in streptozotocininduceddiabetic rats with special reference to glycoproteincomponents. Phytomedicine2012; 19(3-4): 211-216.

[40] Sattar EA, Elberry AA, Harraz FM, Ghareib SA, Nagy AA,Gabr SA. Antihyperglycemic and hypolipidaemic effects ofthe methanolic extract of Saudi mistletoe (Viscum schimperiEngl.). J Adv Res 2011; 2: 171-177.

[41] Sunil C, Ignacimuthu S, Agastian P. Antidiabetic effect ofSymplocos cochinchinensis (Lour.) S. Moore. in type 2 diabeticrats. J Ethnopharmacol2011; 134: 298-304.

[42] Sonawane RD, Vishwakarma SL, Lakshmi S, Rajani M, PadhH, Goyal RK. Amelioration of STZ-induced type 1 diabeticnephropathy by aqueous extract of EnicostemmalittoraleBlume and swertiamarin in rats. Mol Cell Biochem2010; 340:1-6.

[43] Feshani AM, Kouhsari SM, Mohammadi S. Vacciniumarctostaphylos, a common herbal medicine in Iran: Molecularand biochemical study of its antidiabetic effects on alloxandiabeticWistar rats. J Ethnopharmacol2011; 133: 67-74.

[44] [Poongothai K, Ponmurugan P, Syed Zameer Ahmed K,Senthil Kumar B, Sheriff SA. Antihyperglycemic andantioxidant effects of Solanum xanthocarpumleaves (fieldgrown &in vitro raised) extract on alloxan induced diabeticrats. Asian Pac J Trop Med 2011; 778-785.