

List of Anti-Diabetic Plants: A Review

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Abstract: Diabetes is a serious disease worldwide which may even lead to death. It is a metabolic disorder characterized by the increased blood glucose level. This condition is known as hyperglycemia. It is associated with various diseases like neuropathy, peripheral vascular diseases, retinopathy etc. Patients with diabetic experiences symptoms like polydipsia, polyuria, and weight loss, poor healing, fatigue blurred vision etc. There are 3 types of diabetes mellitus. They are: type 1 diabetes, type 2 diabetes, gestational diabetes. Increased blood glucose level is due to lack of insulin secretion. Insulin is a hormone secreted by beta cells of the Islets of Langerhans of pancreas. Insulin act like a key which opens the cell membrane through which glucose from the bloodstream are absorbed and such glucose enters into the cellular metabolism in which it breakdowns into several compound and provides energy in the form of ATP. For several cellular metabolism glucose seems to be a starting compound. Breakdown of glucose is known as glycolysis. Complication in insulin secretion leads to diabetes. In nature, many plants have phytochemicals which has an ability to treat diabetes. Secondary metabolites are isolated from those medicinal plants and are being used in diabetic medicines. This review article, reviews some of the list of anti-diabetic plants which are commonly used to treat diabetes mellitus.

Keywords: Insulin, cellular metabolism, hyperglycemia, phytochemicals, diabetes mellitus, retinopathy, neuropathy

1. Introduction

Diabetes mellitus is a life threatening metabolic disorder, characterized with increased blood glucose level known as hyperglycemia. Glucose in the blood is up taken by the cells of gastrointestinal, liver, muscles and fat cells. Glucose gets break down into various compound, thus provides energy in the form of ATP for the cellular metabolism. Wherein, excess of glucose are stored in the liver in the form of glycogen.

Insulin is an endocrine hormone secreted by beta cells in islets of Langerhans act as a transport medium of glucose into the cell. Insulin binds to the cell membrane and thus facilitates glucose molecules inside the cell, which involves in cellular metabolism. When the blood glucose level decreases, alpha cells of pancreas secrete another type of hormone called glucagon, which stimulate liver cells to produce glucose. On the other hand small amount of insulin is also produced by beta cells of pancreas called basal insulin. If, beta cells fail to produce insulin in an appropriate amount, glucose in the blood gets increased since it was not absorbed by the cells of gastrointestinal, liver, muscles and fat. This condition leads to diabetes in general.

Types of Diabetes Mellitus

This condition may fall in 3 types namely:

- 1) Type 1 diabetes
- 2) Type 2 diabetes
- 3) Gestational diabetes

Type1 Diabetes

Type1 diabetes is also known as insulin dependent diabetes. Around 10–15% of people with above the age of 60 years are found to fall in this type1 diabetes. Here islets of Langerhans are destructed by various factors like genetics, toxic, immunologic etc. destruction of pancreatic cells seem to be an autoimmune response of antibodies against the normal tissues of the pancreas.

Destruction of pancreatic cells results in

- 1) Decreased insulin production
- 2) Uncontrolled production of glucose by the liver
- 3) Hyperglycemia
- 4) Decreased glycogen and thus glucose remains in the bloodstream.

Thus, glucose remains to be excess in the blood. Because, of this kidney loss its ability to reabsorb all the filtered glucose. And so glucose appears to be excess in urea known as glycosuria. Excess of glucose in the urine leads to excessive loss of fluids and electrolytes. This condition is known as osmotic diuresis. Insulin inhibits glycogenolysis (breakdown of the stored glucose) and gluconeogenesis (production of new glucose). This takes place in an unresting manner in the patient with insulin deficiency. As a result fats get breakdown which leads to increased production of ketones. Ketones are acids that imbalances the acid-base balance of the body.

Type2 Diabetes:

This type of diabetes is commonly seen in people above 30 years. It is found that nearly 95% among people with diabetes falls in type2 diabetes. This type of diabetes is also known as non-insulin dependent. Type2 diabetes is even common among adolescence due to obesity. Insulin, a key for the glucose to get in to the cell loss its ability i.e. insulin is less effective at stimulating glucose uptake. Thus glucose from the food remains to be in the bloodstream, which results in hyperglycemia. This condition is also known as insulin resistance. This can be overcome by increased production of insulin by beta cells.

2. Gestational Diabetes

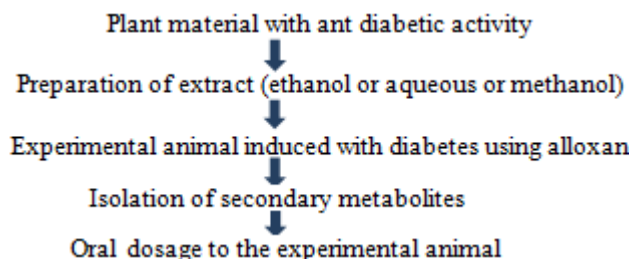
Diabetes caused during pregnancy, because of the secretion of placenta hormones, which inhibits the action of insulin. Gestational diabetes leads to hypertensive disorders during pregnancy. After delivery blood glucose level become normal and in some cases it may also develop into type2 diabetes.

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3. General Methods of Phytochemical Analysis



List of Medicinal Plants with Anti Diabetic Activity

BOTANICAL NAME	COMMON NAME	FAMILY	PARTS USED
<i>Trigonella foenum graecium</i>	fenugreek	Fabaceae	Seeds
<i>Ocimum tenuiflorum</i>	tulasi	Lamiaceae	Leaves
<i>Aegle marmelos</i>	Bengal quince	Rutaceae	Leaves
<i>Plantago ovata</i>	Isabgol	Plantaginaceae	Seeds
<i>Catharanthus roseus</i>	Madagascar periwinkle	Apocynaceae	Leaves
<i>Allium cepa</i>	Onion	Liliaceae	Bulbs
<i>Azadirachta indica</i>	Neem	Meliaceae	Leaves
<i>Aloe vera</i>	Aloe vera	Liliaceae	Juice / leaves
<i>Mangifera indica</i>	Mango	Anacardiaceae	Leaves, seeds, kernel
<i>Terminalia chebula</i>	chebulicmyrobelan	Combretaceae	Seed
<i>Eugenia jambolana</i>	jambul	Myrtaceae	Leaves
<i>Linum usitatissimum</i>	flax	Linaceae	Seeds
<i>Acacia arabica</i>	wattles	Fabaceae	Bark
<i>Alchemilla mollis</i>	Lady's mantle	Rosaceae	Root
<i>Annona squamosa</i>	Sugar apple	Annonaceae	Leaf
<i>Acacia nilotica</i>	babool	Fabaceae	Leaf
<i>Artemisia pallens</i>	Davana	Asteraceae	Leaf arial parts
<i>Areca catechu</i>	Palm tree	Arecaceae	Leaf
<i>Beta vulgaris</i>	chukkander	Amaranthaceae	Leaf
<i>Boerhavia diffusa</i>	punarnava	Nyctaginaceae	Leaf
<i>Bombax ceiba</i>	Cotton tree	Malvaceae	Bark
<i>Butea monosperma</i>	palara	Fabaceae	flower
<i>Camellia sinensis</i>	Black tea	Theaceae	leaves
<i>Capparis decidua</i>	pinju	Capparaceae	Fruit
<i>Caesalpinia bonduca</i>	Grey nicker	Caesalpinaceae	Seed
<i>Coccinia indica</i>	Ivy gourd	Cucurbitaceae	Fruit
<i>Emblica officinalis</i>	amla	Phyllanthaceae	Fruit
<i>Eugenia uniflora</i>	Pitanga	Myrtaceae	leaf
<i>Enicostema littorale</i>	Krimihrita	Gentianaceae	Whole plant
<i>Ficus bengalensis</i>	Banyan	Moraceae	Bark
<i>Gymnema sylvestre</i>	Cow plant	Apocynaceae	Leaf
<i>Hemidesmus indicus</i>		Apocynaceae	Root
<i>Hibiscus rosa sinensis</i>	Shoe flower	Malvaceae	Flower
<i>Ipomoea batatas</i>	Sweet potato	Convolvulaceae	Leaf
<i>Momordica cymbalaria</i>	Kadavanchi	Cucurbitaceae	Tuber, fruit
<i>Momordica charantia</i>	Bitter melon	Cucurbitaceae	Leaf, whole plant
<i>Murraya koenigii</i>	Curry leaf	Rutaceae	Root
<i>Musa sapientum</i>	Banana	Musaceae	Fruit peel, leaf, flower, stem
<i>Phaseolus vulgaris</i>	White kidney bean	Fabaceae	Bean
<i>Punicagranatum</i>	Pomegranate	Lythraceae	Leaf, Fruit peel.
<i>Salacia reticulata</i>	Kothalahimbutu	Celastraceae	Root, bark stem
<i>Scoparia dulcis</i>	Sweet broom, licorica weed	Plantaginaceae	
<i>Swertia chirata</i>	Chirayata	Gentianaceae	Whole plant
<i>Syzygium alternifolium</i>	Shahajire	Myrtaceae	Fruit pulp
<i>Terminalia bellerica</i>	Bebric	Combretaceae	Fruit
<i>Tinospora crispa</i>	Heart- leaved moonseed	Menispermaceae	Stem
<i>Vinca rosea</i>	Madagascar periwinkle	Apocynaceae	Whole plant
<i>Withania somnifera</i>	Ashwagandha	Solanaceae	Root and leaf
<i>Allium sativum</i>	Garlic	Amaryllidaceae	Bulbs
<i>Arctium lappa</i>	Burdock	Asteraceae	Root
<i>Berberis lyceum</i>	Indian barberry	Berberidaceae	Root
<i>Cinnamomum zeylanicum</i>	Cinnamon	Lauraceae	

<i>Cinnamomum tamala</i>	Tejpat	Lauraceae	Leaf
<i>Costus pictus</i>	Painted spiral ginger	Costaceae	Leaf
<i>Ficus racemosa</i>	Cluster fig tree	Moraceae	Root
<i>Ginkgo biloba</i>	Ginkgo tree	Ginkgoaceae	
<i>Helichrysum italicum</i>	Curry plant	Asteraceae	Leaf
<i>Lagerstroemia speciosa</i>	Giant crape myrtle	Lythraceae	Leaf
<i>Vitis vinifera</i>	Grapes	Vitaceae	Seed
<i>Panax ginseng</i>		Arabiaceae	Root
<i>Phyllanthus amarus</i>	Stone breaker	Euphorbiaceae	Leaf
<i>Prunus dulcis</i>	Almond	Rosaceae	Nut
<i>Abelmoschus esculentus</i>	Ladies finger	Malvaceae	Fruit, Peel
<i>Pterocarpus marsupium</i>	Indian kino Vijayasar	Fabaceae	Wood
<i>Stevia rebaudiana</i>	Candy leaf	Asteraceae	
<i>Tinospora cordifolia</i>	Guduchi	Menispermaceae	Roots
<i>Vaccinium myrtillus</i>	Blue berry	Ericaceae	Leaf
<i>Anacardium occidentale</i>	Cashew	Anacardiaceae	Leaf
<i>Cuminum cyminum</i>	Cumin seeds	Apiaceae	Seeds
<i>Galega officinalis</i>	Goat's Rue seeds	Fabaceae	Seeds
<i>Gymnema sylvestre</i>	Gymnema	Apocynaceae	Leaf
<i>Olea europaea</i>	Olive	Oleaceae	Leaf
<i>Oplopanax horridus</i>	Devil's club	Arabiaceae	Root, Bark
<i>Opuntia sps</i>	Prickly pear	Cactaceae	Stem, Fruit
<i>Taraxacum officinale</i>	Dandelion plant	Asteraceae	Whole plant
<i>Urtica dioica</i>	Stinging nettle plant	Urticaceae	Whole plant
<i>Apium graveolens</i>	Celery	Apiaceae	Seeds
<i>Bupleurum falcatum</i>	Sickle leaved hare's ear	Apiaceae	Root
<i>Centella asiatica</i>	Gotu kola	Apiaceae	Leaf
<i>Rosmarinus officinalis</i>	Rosemary	Lamiaceae	Leaf
<i>Artemisia absinthium</i>	Wormwood	Asteraceae	
<i>Morus allea</i>	White mulberry	Moraceae	Stem, bark
<i>Agaricus bisporus</i>	White button mushroom	Agaricaceae	PSC extract
<i>Zingiber officinalis roscoe</i>	Ginger	Zingiberaceae	Juice
<i>Myrcia uniflora</i>	Pedahumecaã	Myrtaceae	Leaf
<i>Myrcia bella</i>		Myrtaceae	Leaf
<i>Opuntia streptacantha</i>	Nopal	Cactaceae	Stem
<i>Silybum marianum</i>	Milk thistle	Asteraceae	Seeds
<i>Eriobotrya japonica</i>	Loquat	Rosaceae	Leaf
<i>Artocarpus heterophyllus</i>	Jack fruit	Moraceae	Leaf
<i>Eucalyptus globulus</i>	Eucalyptus	Myrtaceae	Leaf
<i>Syzygium cumini</i>	Jambul, jambolan	Myrtaceae	Seeds, Leaf
<i>Lupinus albus</i>	White lupin	Fabaceae	Seed
<i>Solanum lycopersicum</i>	Tomato	Solanaceae	Seeds
<i>Citrullus lanatus</i>	Water melon	Cucurbitaceae	Seed
<i>Carica papaya</i>	Papaya	Caricaceae	Leaf
<i>Ananas comosus</i>	Pineapple	Bromeliaceae	Leaf
<i>Citrus lemon</i>	Lemon	Rutaceae	Peel
<i>Jasminum trichotomum</i>	Jasmine	Oleaceae	Arial part
<i>Mentha balsamea</i>	Peppermint	Lamiaceae	juice
<i>Phyllanthus niruri</i>	Keezhanelli	Euphorbiaceae	Leaf

4. Conclusion

Thus, this review article contains a collection of some of the medicinal plants having anti diabetic activity with their family and the parts containing anti diabetic property. This would help researchers to get collection of data regarding plants with anti diabetic activity.