

A REVIEW ON SOME ANTIDIABETIC PLANTS OF INDIA

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ABSTRACT: *The control over diabetes mellitus depends upon the availability of insulin. Various efforts have been made in the recent past to control / check it. There is an increasing demand to use the natural antidiabetic agents. The literature pertaining to antidiabetic herbs is scattered. The present article is a conglomeration of available indigenous literature. It gives an additional information of list of antidiabetic plants which have not been discussed by Nagarajan et al⁷⁶ and Handa et al⁴⁵. It also presents some common plants used in diabetes, and the future of hypoglycaemic herbal drugs.*

INTRODUCTION

Etymologically, the term diabetes can be defined as to “pass through”. The word diabetes has been derived from Greek Word (‘dia’ means through; ‘betes’ means pass). More appropriately it has been defined as the secretion of an inordinate quantity of sweet tasting, urine with a peculiar smell, accompanied with great thirst, dryness of skin, extreme debility, and general emaciation. In diabetes, the deficiency of insulin leads into a complex series of reactions which are clinically manifested as hyperglycemia. It is well known that glucose is an important source of energy for

the cerebral tissue, and if it is lost owing to diabetes, the function of tissue is affected. Earlier, mithridate was used in diabetes in homeopathy.

EARLIER WORK

The early detection and treatment of diabetes has been mentioned in Sushruta Samhita and Charak Samhita. A review of literature vouchers that many investigators have contributed in the field of herbal medicine in relation to diabetes (Table 1).

Table 1. Plants reported by various workers for the cure of diabetes

Name of investigator	Year	No. of Plants
Nadkarni	1954	42
Mukherji	1957	12
Aiman	1970	35
Chaudhury and Vohra	1970	21
Karnick	1972	16
Israili	1977	100
Nagarajan <i>et al</i>	1982	76
Tomoda <i>et al</i>	1987	20
Handa <i>et al</i>	1988	150

SOME HYPOGLYCAEMIC PLANTS

A large number of antidiabetic minerals and drugs of plant origin have been described in classical ayurvedic literature and review given by Nagarajan *et al.*,⁷⁶ and Handa *et al.*⁴⁵. In both the reviews, a detailed account of medicinal herbs used in diabetes has been discussed in detail. The present review incorporate the additional information, and list of medicinal plants not given in reviews mentioned above.

Handa *et al.*⁴⁵ listed 150 medicinal plants which have been used as a cure for diabetes. However, he could not include *Abrus precatorious*, *Adiantum caudatum*, *Aloe vera*, *Andrographis elongate*, *Berginia ligulata*, *Bombax pentandrum*, *Butea monosperma*, *Caesalpinia crista*, *Carica papaya*, *Cassia auriculata*, *C.occidentalis*, *Centratherrum tamala*, *Citrullus colycynthis*, *Costus speciosus*, *Curcuma longa*,

Decalepsia hamiltonii, *Emblica officinalis*, *Hordeum vulgare*, *Ichnocarpus fruteacena*, *Kikzia ramosissima*, *Mangifera indica*, *Moringa oleifera*, *Ougenia dalbergioides*, *Paspalum scorbiculatum*, *Phyllanthus amarus*, *Rheum emodi*, *syzygium alternifolium*, *Solanum nigrum*, *Strychnos potatorum*, *Swertia chirata*, *Talinum portulacifolium*, *Terminalia arjuna*, *T. chebula*, *Tinospora cordifolia* and *Tribulus terrestris* which has been listed in the present review.

Nagarajan *et al.*⁷⁶ proposed a review of 75 medicinal plants. But *Abrus oreicatorious*, *Berginia ligulata*, *Bombax pentandrum*, *Bougainvillea spectabilie*, *Butea monosperma*, *Caesalpinia crista*, *Carica papaya*, *Cassia occidentalis*, *Centratherrum anthelminticum*, *Cinnamomum tamala*, *Citrullus colocynthis*, *Costus speciosus*,

Curcuma longa, *Decalpia hamiltonii*,
Dioscorea bulbifera, *emblica officinalis*,
Ichnocarpus frutescens, *Inula racemosa*,
Melia azadirachta, *Mangifera indica*,
Mangifera oleifera, *Ougenia dalbergioides*,
Paspalum scrobiculatum, *Phyllanthus*
amarus, *Psidium guava*, *Pterocarpus*
santalinus, *Rheum emodi*, *Solanum nigrum*,

Syzygium alternifolium, *Strychnos*
potatorum, *Swertia chirata*, *Talinium*
portulacifolium, *Terminalia arjuna*, *T.*
chebula, *Tinospora cordifolia*, and *Tribulus*
terrestris which are given in the present
review were not included by Nagarajan *et*
*al.*⁷⁶

Table 2 : Medicinal plants used in diabetes

Plant	Family
<i>Abrus precatorious L.</i>	Fabaceae
<i>Acacia catechu</i> (Linn.f.) Willd.	Fabaceae
<i>I. nilotica</i> (L) Del. <i>Sp. indica</i> (Benth) Brenam	Fabaceae
<i>Adiantum caudatum</i> Linn.	Polypodiaceae
<i>Aegle marmelos</i> (Linn.) Corr.	Rutaceae
<i>Aloe vera</i> (L.). Burm. f.	Liliaceae
<i>Andragraphis elongate</i> T. and. Nela Vemu	Acanthaceae
<i>Berginia ligulata</i> (Wall.) Engl.	Saxifragaceae
<i>Bombax pentaridrum</i> Linn.	Bombacaceae
<i>Bougainvillea spectabilis</i> Linn.	Nyctaginaceae
<i>Butea monosperma</i> (Lamk.) Kuntz	Fabaceae
<i>Caesalpinia crista</i> Linn.	Caesalpiniaceae
<i>Carica papaya</i> Linn	Caricaceae
<i>Cassica auriculata</i> Linn	Caesalpiniaceae
<i>C. occidentalis</i> Linn	Caesalpiniaceae
<i>Catharanthus roseum</i> (Linn.) G. Don	Apocynaceae
<i>Centratherum anthelminticum</i> (L.) Kuntze	Asteraceae
<i>Cinnamomum tamla</i> Nees.	Lauraceae
<i>Citrullus colocynthis</i> Schrad	Cucurbitaceae
<i>Coccinia grandis</i> (L.). Voigt.	Cucurbitaceae
<i>Costus speciosus</i> (Koen). Sm.	Zingiberaceae

<i>Curcuma longa</i> Linn.	Zingiberaceae
<i>Cyamopsis tetragonoloba</i> L. (Traub).	Fabaceae
<i>Decalepia hamiltonii</i> Wight & Arn.	Asclepiadaceae
<i>Dioscorea bulbifera</i> Linn.	Dioscoreaceae
<i>Emblica officinalis</i> (Gaertn.)	Euphorbiaceae
<i>Gymnema sylvestre</i> (Retz.) R. Br. Ex. Roemer & Schultz	Asclepiadaceae
<i>Hordeum vulgare</i> Linn.	Poaceae
<i>Ichnocarpus racemosa</i> Hk. f.	Asteraceae
<i>Kickzia ramosissima</i> (Wall.) Jain	Apocynaceae
<i>Melia azadirachta</i> Linn.	Meliaceae
<i>Mangifera indica</i> Linn.	Anacardiaceae
<i>Momordica charantia</i> Linn	Cucurbitaceae
<i>Moringa oleifera</i> Lamk.	Moringaceae
<i>Murraya koenigii</i> (Linn.) Spreng.	Rutaceae
<i>Ougenia dalbergioides</i> Benth.	Fabaceae
<i>Ocimum sanctum</i> Linn.	Lamiaceae
<i>Paspalum scrobiculatum</i> Linn.	Poaceae
<i>Phyllanthus amarus</i> Schun & Thann	Euphorbiaceae
<i>Psidium guajave</i> Linn	Myrtaceae
<i>Pterocarpus marsupium</i> Roxb.	Fabaceae
<i>P. santalinus</i> Linn.	Fabaceae
<i>Rauwolfia serpentine</i> Linn.	Apocynaceae
<i>Rheum emodi</i> Wall.	Polygonaceae
<i>Solanum nigrum</i> Linn.	Solanaceae
<i>Strychnos potatorum</i> Linn. F.	Loganiaceae
<i>Swertia chirata</i> Buch-Hamm	Gentianaceae
<i>Syzygium alternifolium</i> Walp.	Myrtaceae
<i>S. cumini</i> Linn.	Myrtaceae
<i>Talinum portulacifolium</i> Wild.	Portulacaceae
<i>Tecoma stansi</i> (Linn.) Kunth	Bignoniaceae
<i>Terminalia arjuna</i> (Roxb.) ex DO. Datz et. Gibs.	Combretaceae

<i>T. chebula</i> Retz	Combretaceae
<i>Tinospora cordifolia</i> (Willd.) Miers	Menispermaceae
<i>Tribulus terrestris</i> (Linn.)	Zygophyllaceae
<i>Trigonella foegnum – graceum</i> Linn.	Fabaceae

Some common antidiabetic plants

Apte *et al*⁸ studied antidiabetic activity of some indigenous plants. Others who studied hypoglycaemic plants were Nagarajan *et al*⁷⁶ and Handa *et al*⁴⁵.

Some common plants used in hyperglycemia are as below:

1. *Syzygium cumini* Linn.

S. cumini belongs to family myrtaceae. It occurs from Himalaya to South India⁷⁵. The seed powder have been used in diabetes as it reduces the sugar in urine and ameliorates the unquenchable thirst. A glucoside jamboline, ellagic acid, tannin, gallic acid, chlorophyll, fatty oil, resin, sugar and traces of essential oil are also present¹⁰⁶. *S. cumini* was studied in detail by several workers^{1,19,90,102,115}. Suspensions of seed kernel of *S. cumini* 4g / dose level was found to show maximum antidiabetic effect (42.64%) in rabbits 3h after medication⁷⁵. Nair and Santhakumar⁷³ stated that like tolbutamide, drug of *S. cumini* may also be promoting endogenous release of insulin. It produced a significant decrease in the blood sugar level (17.04%) in alloxan diabetic rats.

Further details can be obtained from Nagarajan *et al*⁷⁶ and Handa *et al*⁴⁵.

2. *Pterocarpus marsupium* Roxb.

P. marsupium is known as Indian Kino tree, and belongs to family Fabaceae. The reports on hypoglycemic activity of *P. marsupium*

is related to Pterostilbens, 3 – 4 dimethexystilbene⁹. The activity pertaining to diabetes is matter of controversy^{43,63,95,97}. Mukherjee⁶⁶ and Ray⁶⁷ reported that *P. marsupium* had hardly any hypoglycemic activity. Apte *et al*⁸ confirmed the antihyperglycemic property with the extract of *P. marsupium*.

Antidiabetic activity has been discussed in detail by Handa *et al*⁴⁵.

3. *Melia azadirachta* Linn.

It is a member of family meliaceae. A perusal of literature vindicates that a few reports have been made pertaining to antidiabetic effect of *M. azadirachta*^{68,75,80}. *M. azadirachta* was found to be beneficial in lowering blood sugar level in dogs. Siddiqui¹⁰³ reported that an active agent nimbidin is present in neem oil which is a potent antidiabetic agent in fasting and glucose fed rabbits. Apte *et al*⁸ supported that the diluted concentrate from the fresh leaves of neem reduces blood sugar significantly. The later persists for 12 days in blood sugar, if the treatment is continued.

4. *Momordica charantia* Linn.

It is a member of family cucurbitaceae. The fruits and leaves of *M. charantia* are very useful in diabetes^{27,101,114}. Chatterjee²⁷ reported that fruit pulp is more effective in diabetes than the entire fruit. He found that extract of *M. charantia* can exert its

antidiabetic action in cases where the insulin secretion from pancreas has almost stopped. However, toxic effects have been experienced in large doses. Apte *et al*⁸ reported that blood sugar level returned to the normal level within 24 hours when extract of fruits of *M. charantia* was administered.

5. *Gymnema sylvestre* (Retz.) Roemer & Schultz.

G. sylvestre, commonly known as *Gurmar* is a member of family Asclepiadaceae. There is no taste of sugar after chewing the leaves of this antidiabetic herb. The leaves are used in diabetes. The effect remains up to half an hour. During the treatment of diabetes with this herb, one can eat sugar and starchy food. In Ayurveda, leaves of *Sala Saradhi* has been recommended for the control of maturity onset diabetes in addition to diet restriction¹⁰⁷. *G. sylvestre* is a plant belonging to the group and has been described in Indian material medica⁷⁵. Sushruta¹⁰⁷ described this destroyer of Madhumeha (glycosuria) and other urinary disorders. Mhaskar and Caius⁶⁴ studied the effect of leaves of *G. sylvestre*, Phytol, myoinositol and Scyllitol are present in leaves. Pannerselvam and Shanmugasundaram⁷⁰ reported the hypoglycaemic activity of leaf powder in normal and diabetic men and rabbits.

They reported 15 or 30 percent reduction in the blood sugar level. Rajendra and Shanmugasundaram⁸⁶ have shown that *G. sylvestre* is much effective in diabetes.

G. sylvestre has been discussed in detail by Nagarajan *et al*⁷⁶ and Handa *et al*⁴⁵.

Recently, researchers of Central Drug Research Institute, Lucknow while working with diabetes found that *Swertia chirata* induced significant fall in blood sugar and simultaneous increase in plasma immunoreactive insulin. It can also prove to be promising drug, if more investigation would be carried out.

THE FUTURE

Diabetes is increasing day – by – day, presently, insulin is the only drug before ailing patients. However, some crude drug of herbal origin are in use in the market. Pills of *Momordica charantia* have already been prepared by the scientists. The investigators of CDRI Lucknow have worked out that *Swertia chirata* may be used in diabetes. The future of antidiabetic herbal drugs depend upon the extensive exploration of tribal pockets of India. The promising crude drug must be analysed in clinically manifested hyperglycaemia in the wake of thorough investigation of ethnomedicinal antidiabetic herbs.

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