HERBAL REMEDIES FOR DIABETES: AN OVERVIEW

Shukla A*, Bukhariya V., Mehta J., Bajaj J., Charde R., Charde M, Gandhare B

NRI Institute of Pharmacy, 1 Sajjan Singh Nagar, Raisen Road, Bhopal – 462021, M.P.

E-mail of Corresponding author: kdc_ritu@rediffmail.com

Summary

Today's fast and furious life style one of the major factors, which precipitate the diabetes mellitus. The treatment of diabetes mellitus, which includes the use of insulin and oral hypoglycemic agents sulfonylurea, biguanides. Diabetes mellitus one of the major disorder which is growing at faster rate second after cancer. Long-term use of these medications will create unwanted side effects, resulting uncontrolled increase in blood sugar as well as complications with heart diseases also diabetics are highly prone to different types of microorganism and it will affect immune system of body. To avoid such problems herbal medications has greater advantages. Instead of using these types of allopathic formulations, it is beneficial to use Ayurvedic formulations for better management of diabetes mellitus. In this review, around hundred of herbal plants were showing hypoglycemic activity and still they are using as home remedies for the effective treatment for diabetes mellitus.

Keywords: Diabetes mellitus, Insulin, Herbal Remedies

Introduction

Diabetes mellitus is one of the common metabolic disorders, and 2.8% of the population Suffer from this disease throughout the world and it may cross 5.4% by the year 2025 Diabetes mellitus is a group of many different disease also. Because, Hyperglycemia causes damage to eyes, kidneys, nerves Heart and blood vessels. Diabetes is one of the Causes of renal end- stage disease it is cause by inherited and/or acquired deficiency in production of insulin by the Pancreas or by the ineffectiveness, of the insulin Produced it results either from inadequate Secretion of hormone insulin. However, it is believe that uncontrolled high blood sugar leads to the development of kidney damage especially when high blood Pressure is also present. Hyperglycemia generates more reactive Oxygen species and Attenuates Anti-oxidative mechanism through glycation of the Scavenging enzymes Therefore oxidative stress has been considered to be a common Pathogenic factor of the diabetic so Traditionally Herbal folk, medicine is most popular, which have antioxidant property, and 1000 side effect. Due to Antioxidant property, these drugs give good results. And Reduce the glucose level some Herbal folk medicinal plants have been reported which are useful in diabetes treatment now days more than 400 plants are being used in different from for Hypoglycemic effects all the claims practitioners or users Therefore a proper scientific evaluation & Screening of plant by Pharmacological tests followed by chemical Investigation is necessary.

Type l: Diabetes Mellitus

This results when the pancreas produces insufficient amounts of insulin to meet the body's needs. A trigger-either an illness or stress-causes the immune system to attack and destroy the beta cells of the pancreas. As a result, pancreas stops producing insulin. The primary treatment for Type I diabetes is to take insulin injections everyday to survive. This form of diabetics is also called insulin Dependent Diabetes Mellitus (IDDM). Type I develops suddenly in childhood or adolescence.

Type II: Diabetes Mellitus

This result when the pancreas produces insulin, but the cells are unable to use it efficiently; this effect is called 'insulin resistance'. Type II diabetes is far more common than Type I and approximately 90% of all diabetes cases are Type ll. There is a strong genetic predisposition for Type ll diabetes. Age, obesity and sedentary lifestyle are also risk factors. This form of diabetes is called known Non-Insulin Dependent Diabetes Mellitus (NIDDM). Type ll mainly affects people over age 40 and is more common in overweight people.

Gestational Diabetes Mellitus (GDM)

This is glucose intolerance being recognized during pregnancy. It can complicate pregnancy leading to prenatal morbidity and mortality, so clinical detection is important.

Other specific types of diabetes

Maturity onset diabetes of youth (MODS) is due to impaired insulin secretion minimal or no insulin resistance, so hyperglycemia is noticed at an early stage. Genetic inability to convert proinsulin to insulin causes mild hyperglycemia

Pathological features of Diabetes Mellitus are due to the Following factors:--

1) Decrease in utilization of glucose by the body cells. This results in increase in blood glucose concentration to 300 to 1200 mg/di
2) Increase in mobilization of fats from the fat storage areas. This results abnormal fat metabolism and deposition of cholesterol in arterial walls causing atherosclerosis.
3) Tissues get depleted form protein i. e. protein depletion in tissues.

Role of insulin and glucagon

Glycogen synthesized, stored and secreted by the alpha-cells of islets of langerhans. Glucose is the major regulator of glucagons secretion, hyperglycemia inhibits while hypoglycemia stimulate the release or glucagons. The release of insulin form the beta cells of pancreas is stimulated by increase blood glucose level. Thus, glucagons and insulin is mutually antagonist to each other in functions. Herbal drug with antidiabetic activity from ancient period, peoples are using herbal plants as home remedies for treatment of diabetes. The treatment is design to control Glucose level in blood. This is the immediate goal, which is to stabilize the blood sugar and eliminate the symptoms of high blood sugar. The long-term goals o9f herbal treatments are to prolong life, improve the quality of life, relieve symptoms, and prevent complications.

The main advantage of herbal drug is that, it is safer and cured disease with less side effect and have safer than synthetic drug. Some of the herbal used for treatment of diabetes are as follows:

Tabel 1: Some herbal plants with Antidiabetic activity.

S. No.	Name	Biological Name	Family	Part used for activity
1	Agrimony	*Agrimonia eupatoria* L.	Rosaceae.	Herb.
2	Alfalfa	*Medicago sativa* L.	Fabaceae.	Herb.
3	Aloe vera	*Aloe barbadensis*	Liliaceae.	Leaves.
4	Burdock	*Arctium lappa* L.	Asteraceae.	Root.
5	Celery	*Apium graveolens* L.	Apiaceae	Fruit.
6	Cornsilk	*Zea mays* L.	Gramineae	Stigma, Style.
7	Damiana	*Tumera diffusa Willd.*	Turneraceae	Leaf, Stem
8	Dandelion	*Taraxacum officinale Weber.*	Asteraceae	Leaf, root.
9	Elecampne	*Inula helenium* L.	Asteraceae	Rhizome, Root.
10	Eucalyptus	*Eucalyptus globules Labill.*	Myraceae	Leaf.
11	Fenugreek	*Trigonella foenum-graecum* L.	Leguminosae.	Seed.
12	Garlic	*Allium sativum* L.	Amaryilidaceae	Bulb (clove)
13	Ginger	*Zingiber officinaie*	Zingiberaceae.	Rhizome.
14	*Gindeng panax*	*Panex species; P.ginseng Meyer, P.quinquefclius* L.	Araliaceae.	Root.
15	Ispaghula	*Plantago ovata Forsk.*	Plantaginaceae.	Seed, husk.
16	Java tea	*Orthosiphon stamineus Benth.*	Lamiaceae.	Dried leaves,Stems.
17	Juniper	*Juniperus communis* L.	Pinaceae	Fruits (Berry).
18	Marshmallow	*Althaea officinalis* L.	Malvaceae.	Leaf, Root.
19	Myrrh	*Xommiphora molmol; C.abyssinca eng*	Bursuraceae	Oleo-gum-resin
20	Nettle	*Urtica dioica* L.	Urticaceae	Herb.
21	Sage	*Salvia officinalis* L.	Labiatae	Leaf.
22	senega	*Polygala senega* L.	Polygalaceae	Root
23	Tansy	*Tanacetum vulgare* L	Asteraceae	Herb.

Other herbal plants with antidiabetic activity are *Abroma august* Linn. *Acacia modesta* Wall, *Acacia nilotica* Linn, *Aconitum ferox Wall, Adhatoda vasika Nees, Adiantum capillus-veneris* Linn, *Adiantum incisum* Forsk, *Albizia stipulate Sensu Barker, Alpinia galangal* Wild, *Anacardium occidentale* Linn, *Areca catechu* Linn, *Azadiracta indica* A. Juss, *Bauhinia semla* Wunderlin, *Benincasa hispida* Cong, *Bougainvillea spectabilis* Willd, *Brassica oleracea* Linn, *Casearia esculenta* Roxb, *Cassia auriculata* Linn, *Cassia fistula* Linn, *Cassia sophera* Linn, *Catharanthus roseus* G.Don, *Citrus aurantium* Linn, *Clerodendurm Phlomidis* Linn, *Coccinia indica* Wight, *Cynara scolymus* Linn, *Daucus carota* Linn, *Dolichos lablab* Linn, *Emblica officinalis* Gaertn, *Enicostemma littorale Blume*, *Ensete superbum* Roxb, *Eriodendron anfractuodum* DC, *Erythrina indica* Lam, *Ficus begalensis* Linn, *Ficus racemosa* Linn, *Glycine max* Merrill, *Gymnema sylvestre* R.Br. *Herlicteres isora* Linn, *Hordeum vulgare* Linn, *Indigofera arecta* Hochst, *Ipomoea nil* Linn, *Lagerstroemia speciosa* Pers. *Lupinus albus* Linn, *Mangifera indica* Linn, *Momordica charantia* Linn, *Morus alba* Linn, *Mucuna prurita* Hiik, *Murraya kienigii* Linn, *muasa sapeintum* Linn, *Nigella sativa* Linn, *Nymphaea nouchale* Burm, *Ocimum sanctum* Linnm *Olea europaea* Linn, *Orchis mascula* Linn, *Orthosiphon spiralis Merill,Pinus roxburghii Sarg, Portulaca oleracea* Linn, *Prunus persica* Batsch, *Pterocarpus marsupium* Roxb *Punica granatum* Linn, *Quercus infectoria Olivier*, *Rauvolfia serpentine* Benth, *Ricinus communis* Linn, *Rivea cuneata* Wight, *Salacia macrosperma* Wight, *Saussurea lappa* C.B.Clarke, *Scoparia dulcis* Linn, *Securigera securidaca* Linn, *Spathodea campanulata* Beauv, *Strychnos potatorum* Linn, *Swertia chirayita* Roxb, *Tecoma stans* Linn, *Trifolium alexandrinum* Linn, *Trigonella foenum-graecum* Linn, *Urtica diocal* Linn, *Xanthium strumarium* Linn.

Table 2: Chemical Composition and other Biological Activity:

S. No.	Name	Chemical Constituents	Biological Activity
1	Agrimony	Apiginin, lutiolin, ellagitannin, Quercitrin, ursolic acid.	Astringent: colitis; diuretic; diarrhea; cystitis.
2	Alfalfa	Malonic acid, trigonellinge, arginine, medicagol, genistein, campesterol, B-carotene	Arthritis; peptic ulce, bactericidal; emetic; cardiatonic; diuretic.
3	Aloe Vera	Pentocides-Barbaloin, aloin, isobarbaloin, betabarbaloin.	Catharatic; Prgative; Constipation.
4	Burdock	Fukinone, B-setolone, resin, B-inesmol, myristic, rutaretin.	Gout; rheumatism; diuretic; eczema; psoriasis.

5	Celery	Apiginin, apigravin, celerin, B-eudesmol, myristic, rutaretin.	Antirhrumatic; sedative; urinary antiseptic; gout, rheurnatold arthritis; diuretic
6	Corn silk	Linoleic, oieic, palrnitic acid, phytosterols, pigments, vitamin(C&K)	Diuretic; stone reducing properties; noctumal enuresis; prostatitis; acute and chronic inflammation.
7	Damiana	Tetrraphyline B, calamine, 1-8-cineole,B-copaene, arbutin.	Antidepressant; thomopetic, mild purgative; stomachic; aphrodisiac properties.
8	Dandelion	Cichoric acid, aesculin, lueteolin-7-diglucoside, oieic acid, onocafferyl tartaric acid.	Gllstone: diuretic laxative; cholechstitis; Jaundic; atonic dysphasia.
9	Elecampane	B and y- sitosterol, stigmasterol, friedelin, alantic acid, azulene.	Expectorant; antitussive; diaphoretic; bactericidal; pulmonary tuberculosis.
10	Eucalyptus	Citronellal, citronellol B-pinene, p-cymene cineole, linallol.	Antibacterial; Anti-inflammatory.
11	Fenugreek	Gentianine, trigonelline, choline, tigogenin.	Mucilaginous demulcent; laxative; nutritive; expectorant.
12	Garlic	Allinase, peroxidase, myrosinase, aliyipropyl disulfide, ajoene, s-allylmercapotcysteine.	Diaphoretic, expectorant, antispasmotic, antiseptic, antiviral, hypotensive, Anthelmintic.
13	Ginger	Starch, palmitic acid, oleic acid, linolenic acid, caprylic acid, arachidic cid, zingerone, zindiberol.	Carminative, diaphoretic, antispasmodin.
14	*Ginseng panax*	Protopanaxadiol, protopanaxatriol, panacene, limonene, terpineol.	Thymoleptic, sedative,demulcent, stomachic, Aphrodisiac.
15	Ispaghula	Boschniakine, boschinakinic acid, aucubin, placteose, priterpine.	Demulcent, laxative.
16	Java tea	Orthochromene, methylripariochromene, acetovanillochromene, Dieterpenes, ß-elemene, β-caryophyllene.	Hypertension, diabetes.
17	Juniper	Diterpene acids, ascprbic acid, glucurosnic acid,	Diuretic, antispasmodic, carminative, stomachic,

		amento- flavone, proanthocyanidins.	antirhumatic.
18	*Marshma-llow*	Arabinas, glucans, arabinogalactans,isoscutellarin, ferulic, syringin.	Demulcent, expectorant,Emollient, direritcs; Antilithic.
19	Myrrh	Arabinose, galactose, ά-, β-, γ- commiphoric acid, commiphorinic acid.	Anitimicrobial, astringent, carminative; Expectorant, antiseptic anticatarrhal.
20	Nettle	Carbonic, isorhamnetin, kaempferol, quercetin.	Antihaemorrhagic.
21	Sage	5-methoxysalvigenin, camasol, 1, 8-cineole, linalyl acetate.	Carminative; antispasmodic; antiseptic; astringent.
22	Senega	Hydroxycinnamin acid, arabinose, melibiose, 1,5-anhydro-D glucitol.	Expectorant, diaphoretic; emetic.
23	Tensy	β- sitosterol, campesterol, taraxasterol, ά-amyrin.	Anthelmintic, carminative, Antispasmodic.
24	*Embelica officinalis*	**V**itamine, phyllemblin tannins.	Diuretic Laxative.
25	Curry tree *murraya koenigir*	Pyroanocarbazole type aldaloid myrrayacine Girinimbine	Antidiarrhocal antioxidant.
26	Blueberry leave	Caffeoylquinic 3,5 dicafeylqunic neo chloroqnic 4 caffcoyl quinic 3coumaroulqunic Chloroqenic Acid.	Diabetes.
27	Steviarebaudiana	Hydrocarbons & Diterpenes, glucosides Stevioside, Rebaudioside Dulcoside, Rebaudioside.	Diabete&Herbal supplement.
28	*Cinnamon Zeylanicum*	Eugenol, Cinnamaldehyde Phellandrene, Pinene Cymene, Caryolonyllenq.	Carminative Stomachic Astringent Antiseptic.
29	*Feniculam Valgare*	Fenchone, Anethole Phellandrene Lemonene	Carminative Expectorant Flavauring Agent.
30	*Capparis deciduas*	Isothiocynate, Glucoside Glucocapparin, n-Pentacsane n-tricontanol	Dietary supplement.
31	Bhumi Amla *Phyllanthus Amarus*	Lignans-a diarulbutane Phyllanthin Hypophyllanthin Amariin, Amarulone.	Diuretic Antiviral Anticancer Hepatoprotective.

32	*Ailanthus excelsa*	Phytol, linolenic Acid Flavonoids, Saponins Saponins, Protein Quassinoids, terpenoids Cumarins.	Antifungal Antileukemic.
35	*Centellqasiatlica*	Asiaticoside madecassoside.	Leprosy nervine tonic Sedative skin disease.
36	*Withaniasomnifera*	Withanine, somniferine somnine, withananine tropine, Ansferine Di-Isopelletierine withaferin, withaferine-A withanolide D.	Sedative, Hypnotics Respiratory Stimulant Fmmunomodulatory.
37	*Picrorrhiza Krroa*	Picroside-I , Picroside-II , kutkiside.	Bittertonic Antiperiodic Febifuge stomachic.
38	*Aeglemarmelos corr.*	Marimelosin Furocumarin	Digestive Antidiarrhoreal.
39	*Trigonellafoenum-graecum*	Protein, starch. B carolene, gum Lipid, Ca, p, Fe, Zn, Mn, "Trigonelline" Sesquiterpene.	Carminative Diabetes Heart disease Aphrodisiac.
40	*Momordica charantia*	Triterpenoid, Saponins Charantin, momordicin.	Hypoglucemic.
41	*Azadirachta Indica*	Azadirachtin Meliantriol Nimbin, Nimbidin, Myricitin.	Insecticide Nematicide Mematicide Antimicrobial Spermicidal.
42	*Commiphoramyrrha*	Sesquiterpenes & Acid a pinene, cadinene Limonene, Eugenol, Cuminaldhyde Acetic Acid, m-cresol.	Wound Healing Antibacteral Antiseptic, Respiratory disease.
43	*Evolvulus alsinoides*	Shankhpushpine Volatile oil	Braintonic Sedative.
44	*Embeliaribes*	Embelin known as z, s Dihydroxy-3 undecyl-l,4 – benzoquinone	Antioxidant Antimicrobial Anthelmintic oral contraceptive.
45	*Mesuaferrea linn*	Betulinic Acid. 1,8 dinydroxy-3methoxy6-methul anthraquinone, Hydrocarbons, Carboxylic Acid.	Antibiotic Astringent Stomachic Expectorent Dysentry.
46	*Sweritachirayata (Gentianaceae)*	Gentiopcrin	Stomachic Antiphretic.
47	*Terminalia bellerica*	Gallic Acid, Chebulogic Acid	Astringent.
48	*Terminaliachebula*	Chebulic Acid chebulogic Acid gallic acid.	Astringent Stomachic Purgative.
49	Acacia-or *Acaciaarabica*	Arabin oxidase	Emulsifying suspending Microenapsulation.

50	Shilajeet	Herboiminerals	Generaltonic Aphrodisiac.
51	*Pterocarpus Marsupinum*	Kinotannic Acid kinored K-Pyrocotechin (Catechol) Resin, gallicacid.	Astrigent Diarrhoea Dysentry Hypeoglycemic.
52	*Andrographis-Paniculat*	Androgrpholide	Bitter tonic Anthelmentic Hepatoprotective.
53	*Ailiumsativum*	Carbohudrate, Proteins Fat, Phosphorus Potassium, Calcium Allin.	Antioxidant Hypatoprotective Amoebic Dyusentery.
54	*Syzygium CuminiLinn*	Flavonoides, Oleanolic Acid, triterpenoides 3,4,5 tetrahydroxy Cyclo nexane-Carboxalic Acid, 3 (3,4 Dihydroxy Cinnamate 10-glycoside.	Bronchiti's Blood Purifier Diabetes.
55	*(Bhilwa) or Semicarpus anacardium*	Biflavonoides, Phenolic bhilawanols, minerals Vitamins, Amino Acid Anacardosidc.	Antilnflammatory Anticancer meuroprotective.
56	*Tinospora cardifolia*	Allcaloids, diterpenoid Lactones Glycoside, steroids Sesquiterpenoid, Phenolics Aliphatic comp. Polysaceharides.	Diuretic, Bittertonic, Aphrodisiac.
57	*(Punarnava) or Boehavia diffusa*	Punarnavine Punernavoside.	Diuretic stomachic Jaundice Tretment.
58	*Terminelia Arjuna*	E- llagic Acid B-sitosterol.	Cardiotonic Hypotenisve.
59	*Bombax cieba*	Lupeol, a sitosterol sesquiterpenes Flovonoid Alkaloids, steroids Caleium & Napthaquinones.	Antidiabetics Antiinflanna to ry Analgesic Antioxidant.

Table 3: Marketed preparation having antidiabetic activity.

S.No	Brand name	Ingredient used	Mfd.by
1	Glucolev	Amaalaki powder, sudha shilagit; jasad bhasma; methika; beej; madhunasimi; ashwagandha.	Bajaj herbal
2	Madhumehari granules	Gudmar; jamun guthly; gulvel; karela beej; khadir chuma; haldi; amla; vijay sar; tejpatra; shilajit; gulalphal chuma; kutki; chitrak;	Baidynath.

		methi; neem patti; bilva patra; trivang bhasma.	
3	Diabegon	Harad; behead; amala; shunthi; pipali; kali mirch; gudmar patra; jamun beej; shudha shilajit; vasant kusma rus; lauha bhasma; trivang bhasma; svama makshik bhasma;	Dindaal aushadhi (P) Ltd.
4	Amree capsule	Tejpatra; bilvpatra; vijay sar, gulalpatr; jamun patra; methi beej; gudmar patra; neempatra; giloe; trivang bhasma; sudhshilajeet.	Aimil pharmaceutical Ltd.
5	Diabecon	Meshshringi; pitasara; yashtimadhu; apatarangi; jambu; shatavari; punamava; mundatika; gudachi; gugul; shilajit; kairla;gokshura; bhumiamalki; gumbhari, karpari; triphala.	Himalaya Aurvedic pharmaceutical.
6	Madhumehari yog (capsule)		Baidynath pharma.
7	IIogen	Glurcumalonga; strynchonos polotarum; slalaciaop longa; innophura cardiophuria; atevetrial zizanioibes; etc.	Pankaj kasturi pharma. Ltd.
8	DBT (Capsule)	Jamun beej; madhunasini; gugul; kutki; haridhara etc.	Dabur pharmaceutical.
9	Glucomap (Tablet).	Enicostemmalittorale; thylanthus neum; ungania jamplona; azadirecta indica; gerulvalae arjuna.etc.	Maharashuri ayurvedic.
10	Glucodap. (Tablet)	Amalaki powder; charan bhasma; methi beej; Jamun beej; etc	Bajaj pharmaceutical.
11	Diabatreat (Syrup)	Areca, Syzygium Cumini Cannabis Sativa Quercus in Fectoria Momordica Charantia, Asperagus Adscendens Azadirachta Indica Tinospora Cardifolia Angle Marmelos, Trigonella Foencum Gurmar leaf Emblica officinalis.	Dhanvantri Pharma.

12	Greek-CD (Tablet)	Debitterised methiseed, Soluble fibres from vegetable orign.	Mitocon Biotec.
13	Gludibit	Gymnema Sylvestre Vijay sar, mamajjak Citrus Limon Sapta chakre.	Lupin Pharma.
14	Nosulin	Guargum, Tundika, methi, Meshasring.	Dey's.
15	Diabeta Plus	Gurmar, Karela, Saptrangi, Ashwagandha, Tulsi.	Krishna Herrbal Company.
16	Divya Madhu Nashni Vati.	Amrita Jambu,Katuki, Nimba Chirayata, Tiktaka Gudamara, Karavellaka (Bittergourd), Kutaja, Go-kshura, Kala-megha Karcura Haridra. Fruit:- Babbula, Krishna Jiraka, Ativisha (Pungent Variety) Ashwagandha, Bilva, Treiphala, Haritaki Bibhitaki, Amalaki Vata, shilajatu, methika etc.	Patanjali Pharma.

Intraperitoneal administration of streptozocin resulted in a reduction in hyperglycaemia. The manganese content of alfalfa (45.5 mg/kg) was reported to be a active principle responsible for a hypoglycaemic affect documented for the herb. Hypoglycemin activity has been shown in alloxan diabetic mice for aloe and in diabetic rat for an aloe gum extract.[10.11] Cornsilk posses hypoglycaemic activity in laboratory animal.[12] Hypoglycaemic activity has been reported in mice following both oral and intraperitoneal administration of damiana.[13] Hypoglycaemin activity has been described in normal, but not in diabetic rabbits, following oesophagal administration of dandelion.[14] An extract of Inula helenium lower plasma and gluconse concentration in rats 75 minutes after oral administration, counteracted adrenaline-induced hyperglycaemia in rats.[15] Leaves extract, on oral administration caused lowering of blood sugar in normal and alloxan diabetic rabbits.Hypoglycemic activity has been observed in rabbit, rat and dog, and attributed to defatted seed fraction (DSF). Ethyl extract of dried garlic bulb powder exhibited hypoglycemic effect in both non-diabetic and alloxan induced diabetic rabbit and rat has been documented for fresh ginger juice administered orally.Hypoglycemic activity observed in both normal and alloxan- induced hypoglycaemic mice administered Ginseng

panax intraperitoneal. Several studies have shown that Ispaghula husk lowered blood glucose concentration due to delayed intestinal absorption. In normoglycaemic rats, oral administration of an aqueous extract of Orthosiphon stamineus 1 gm/kg produced significant decrease in blood glucose concentration.An aqueous decoction of the barrier has a hypoglycaemic effect in rat. The mucilage has demonstrated considerable hypoglycaemic activity in non-diabetic mice.Hypoglycemic activity in both normal and diabetic rat has been reported for myrrh extract.Hypoglycaemic component has been termed 'urticin' and nettle has been reported to lower the blood sugar concentration in hyperglycaemic rabbits. Activity in normoglycaemic, and in alloxan diabetic rabbit was observed, although no change in insulin concentration was noted. Senegin ll and E, Z-sanega saponin a and have significant hypogiycaemic effect in rodent.

Conclusion

The herbal drugs discussed in review have shown potent antidiabetic activity. The synthetic formulation available in market, though they are showing excellent clinical and pharmacological activity in diabetics but they have significant adverse effect hence herbal drugs are preferred over synthetic drug to avoid serious side effects and adverse effects.

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