Research Paper

Volume : 4 | Issue : 9 | Sept 2015 • ISSN No 2277 - 8179

Daibtese:- History and Traditional Medication

Chemistry

KEYWORDS : Oral medications, risks, obesity, macrovascular complications , insulin,etc.,

KESHAV PARASHAR Research Scholar in Mewar University

Dr. SUSHIL K. STARLING DEPARTMENT OF CHEMISTRY, PECIFIC UNIVERSITY

ABSTRACT

Traditional medicines are practiced worldwide for treatment of type II diabetes mellitus since ancient times. This review provides a comprehensive summary of medicinal plant throughout the world regarding their traditional usage by various tribes/ethnic groups for treatment of type II diabetes mellitus. Various treatment options are available in allopathic system of medicine. The prevalence of type II diabetes mellitus is increasing in all over the world. The need for achieving better control of blood glucose level has been evident in type II diabetes mellitus management. A wide number of herbal products are employed in the treatment of type II diabetes mellitus for their better efficacy and safety compared to synthetic medicine.

INTRODUCTION

Diabetes mellitus is a combination of heterogeneous disorders commonly presenting with episodes of hyperglycaemia and glucose intolerance, as a result of lack of insulin , defective insulin action, or both (Sicree *et al.,* 2006). Such complications arise due to derangements in the regulatory systems for storage and mobilization of metabolic fuels, including the catabolism and anabolism of carbohydrates, lipids and proteins emanating from defective insulin secretion, insulin action, or both (Shillitoe, 1988; Votey and Peters, 2004).

Classification of diabetes mellitus is based on its aetiology and clinical presentation. As such, there are four types or classes of diabetes mellitus viz; type 1 diabetes, type 2 diabetes, gestational diabetes, and other specific types (Sicree *et al.,* 2006). Type 1 diabetes is said to account for only a minority of the total burden of diabetes in a population although it is the major type of the diabetes in younger age groups at majority of well-to-do countries. The incidence of type 1 diabetes is increasing in both rich and poor countries. Furthermore, a shift towards type 1 diabetes occuring in children at earlier ages is imminent (Sicree *et al.,* 2006).

ETYMOLOGY OF DIABETES MELLITUS

The terms "Diabetes" and "Mellitus" are derived from Greek. "Diabetes" denotes "a passer through; a siphon" whereas the "Mellitus" denotes "sweet". It is thought that the Greeks named it so due to the excessive amounts of urine produced by diabetics attracted flies and bees. The traditional way of diagnosing diabetes mellitus in ancient Chinese was by observing whether ants are attracted to a person's urine or not. In medieval ages, the European doctors tested for diabetes by tasting the urine themselves, a scene occasionally depicted in Gothic beliefs (Patlak, 2002).[A]

HISTORY OF DIABETES MELLITUS

Diabetes mellitus has been known since antiquity, its treatments were known since the Middle Ages, and the elucidation of its pathogenesis occurred mainly in the 20th century. Non-progressing Type II diabetics almost went undiagnosed (Patlak, 2002).

The discovery of the role of the pancreas in diabetes was made by Joseph Von Mering and Oskar Minkowski in 1889. [A] minority of the total burden of diabetes in a population although it is the major type of the diabetes in younger age groups at majority of well-to-do countries. The incidence of type 1 diabetes is increasing in both rich and poor countries. Furthermore, a shift towards type 1 diabetes occuring in children at earlier ages is imminent (Sicree *et al.,2006*).

They found that upon complete removal of the pancreas from dogs, the dogs exhibited all the signs and symptoms of diabetes and died shortly afterwards.

In 1910, Sir Edward Albert Sharpey-Schafer of Edinburgh in Scotland suggested that diabetics lacked a single chemical which was normally produced by the pancreas.

Name of this chemical was later proposed to be insulin (Himsworth, 1936).

In 1921, Frederick Grant Banting and Charles Herbert Best repeated the work of Von Mering and Minkowski but went a step further and managed to show that they could reverse the induced diabetes in dogs by giving them an extract from the pancreatic islets of Langerhans of healthy dogs. This was a step forward in elucidation of the endocrine role of pancreas in metabolism and existence of insulin (Banting *et al.,* 1922). These scientists proceeded on to isolate insulin from bovine pancreases at the University of Toronto in Canada, thereby leading to the availability of an effective treatment of diabetes mellitus, with the first clinical patient being treated in 1922. The distinction between what is now known as type I and type II diabetes was made by Sir Harold Percival (Harry) Himsworth in 1935 (Himsworth, 1936).

Following these discoveries, other landmark discoveries followed viz; identification of sulfonylureas in 1942, the radioimmunoassay for insulin, as discovered by Rosalyn Yallow and Solomon Berson, Reaven's introduction of the metabolic syndrome in 1988, and identification of thiazolidinediones as effective antidiabetics in the 1990s (Patlak, 2002).

BIOCHEMICAL BACKGROUND OF DIABETES MELLITUS

A regular energy source is a prerequisite for every cell to function in the human body.

Glucose is the body's primary energy source, which circulates in the blood as a mobilizable fuel source for cells

(Piero, 2006; Kibiti, 2006; Njagi, 2006). Insulin is a pancreatic hormone responsible for blood glucose level regulation. The hormone binds to its receptor sites on peripheral side of the cell membranes. It affords entry of glucose into respiring cells and tissues via requisite channels. Insulin stimulates catabolism on glucose into pyruvate through glycolysis. It also upregulates glycogenesis from excessive cytosolic glucose and lipogenesis from excessive cytosolic acetyl-COA. These metabolic events are antagonistic to metabolic events triggered by the hormone glucagon. When glucose levels are at or below threshold, glucose stays in the blood instead of entering the cells (Belinda, 2004).

The body attempts to arrest hyperglycemia, by drawing water out of the cells and into the bloodstream. The excess sugar is excreted in the urine. This is why diabetics present with constant thirst, drinking large amounts of water, and polyuria as the cells try to get rid of the extra glucose. This subsequently leads to glucosuria (Piero, 2006).

As hyperglycemia prolongs, the body cells are devoid of glucose due to the lack of insulin. This forces the cells to seek alternative mobilizable energy sources. In this regard, the cells turn to fatty acids stored in adipose tissue.

The fats are not fuel sources for the red blood cells, kidney cortex and the brain. The red blood cells lack mitochondria in which beta-oxidation pathway rests.

The fatty acids cannot pass the blood-brain barrier. To avail energy to such cells and tissues, the acetyl-CoA arising from catabolism of fatty acids is diverted to ketogenesis to generate ketone bodies, which can serve as alternative fuel sources for such cells and tissues. These ketone bodies are also passed in the urine, thereby leading to ketonuria, which characterizes diabetes mellitus. Build up of ketone bodies in the blood produces ketosis. Ketone bodies are acidic in nature and therefore, their build up in blood lowers blood pH, leading to acidosis. A combination of ketosis and acidosis lead to a condition called ketoacidosis. If left untreated, ketoacidosis leads to coma and death (Belinda, 2004). [B]

Medicinal Plants Possessing Alpha –Glucosidase Inhibitory Activities

Glycosidases are involved in metabolic disorders including type II diabetes mellitus. Inhibition of these glycosidase may be proved effective in type II diabetes mellitus. Various medicinal plants have been evaluated for their efficacy to inhibit glucosidase. *Euonymus sachalinensis, Rhododendron schlippenbachii, Astilbe chinensis* and *Juglans regia* have inhibitory effect on glucosidase, therefore can be a potential natural source for the treatment of type II diabetes mellitus.

Tussilago farfara

Family: Asteraceae. Chemical constituents: It contains mucilage,

tannin, phytosterol, dihydride alcohol and faradial. **Medicinal uses:**

It is used in catarrh, colds, whooping cough, respiratory problems, spasmodic lung problem, stomach trouble, inflammation and bleeding.

Pharmacological activity: It is anti-inflammatory, antispasmodic andhypoglycemic. **Study:** Gao et al. reported the α-glucosidase inhibitory activity of this plant and concluded that flower bud of *Tussilago farfara*is useful in type II diabetes mellitus.

Medicinal Plants Used as Hypoglycemic Agents

Prinsepia utilis Royle

Family: Rosaceae, **Parts used:** Aerial parts. **Chemical constituents:**

It contains pentacyclic triterpenoids. **Medicinal uses:** Oil from seeds is rubifacient and is applied locally in rheumatism. **Pharmacological activity:** It is anti-inflammatory, anti-arthritic and hypoglycemic.

Study: A study was conducted to investigate the anti-hyperglycemic activity of flavonoids from *Prinsepia utilis* Royle in alloxan-induced diabetic mice. Study duration was four weeks. Drug was administered orally. Dose of drug was 300 mg/kg of flavonoids from *Prinsepia utilis* Royle. There was significant hypoglycemic activity of Flavonoids from *Prinsepia utilis* Royle compared with model control group ($P<0.01$).[1]

Ricinus communis L.

Family: Euphorbiaceae, **Common name**: Harnoli. **Parts used:**

Root, leave, oil. **Chemical constituents:** It contains ricinolein, flavonoids, ricin, ricinolic acid, sodium ricinoleate, tristearin.

Medicinal uses: It is used in constipation, pain and inflammation.

Pharmacological activity: It is anti-inflammatory, laxative and hypoglycemic.

Study: Hypoglycemic activity of 50% ethanolic extract of roots of *Ricinus communis* was investigated. Effective dose was 500 mg/kg body weight. There was significant decrease in fasting blood glucose level. Hypoglycemic activity was observed in normal as well as diabetic animal model. Study duration was 20 days. There was significant reduction in lipid profile and liver and kidney functions were normal during the study period. Fractionation of this extract was done and these were tested for antihyperglycemic activity. Fraction (R-18) exhibited significant hypoglycemic activity. This drug was safe because there was no effect on liver and kidney function and all enzymes were normal. [2]

Aloe vera

Family: Xanthorrhoeaeceae, **Chemical constituents**: It contains anthraquinone glycosides, free anthaquinones, resins, glucomannan, steroids, organic acids, enzymes, antibiotic principles, amino acids, cinnamic acid and salicylic acid, essential oil.

Medicinal uses: It is used in inflammation, wounds and bacterial infections. **Pharmacological activity:** It is soothing, anti-inflammatory, emmengogue, emollient, and antibacterial.

Study: Rajasekaran et al. reported the hypoglycemic effect of *Aloe vera* gel on streptozotocin-induced hyperglycemia in experimental rats [3]. Okyar et al. reported the antidiabetic effect of *Aloe vera* in type II diabetic rat models.

Crataeva nurvala Buch

Family: Capparidaceae. **Parts used:** Leaves. **Chemical constituents:** It contains tannin and saponin. **Medicinal uses:** It is used in diabetes mellitus. **Pharmacological activity:** It is hypoglycemic.

Study: Sikarwar and Patil reported the antidiabetic activity of *Crateva nurvala* stem bark extracts in alloxan-induced diabetic rats .[4]

Hyssopus officinalis

Family: Lamiaceae. **Chemical constituents:** It contains glycosides, essential oil, tannins, resins, fats, sugar, mucilage, flavonoid glycoside.

Medicinal uses: It is used in abdominal pain, respiratory tract infections, insomnia, constipation, viral infections and gastrointestinal disorders. **Pharmacological activity:** It is antispasmodic, expectorant, sedative, carminative, diaphoretic, antiviral, astringent, tonic and stomachic.

Study: Miyazaki et al. has studied the inhibitory effect *Hyssopus officinalis* extracts on intestinal alpha-glucosidase activity and postprandial hyperglycemia.[5]

Trigonella foenum-graecum L.

Volume : 4 | Issue : 9 | Sept 2015 • ISSN No 2277 - 8179

Family: Fabaceae, **English Name:** Fenugreek. **Local Name**: Maithi.

Chemical constituents: It contains trigonelline, flavonoid, glycosides, saponin, ascorbic acid, fenugreekine. **Medicinal uses:** It is used in type II diabetes mellitus, respiratory tract infections, swelling, body pain, stomach pain, piles, dandruff, baldness, breast pain, lungs infection, ulcer and diarrhea. **Pharmacological activity:** It is anti-inflammatory, tonic and hypoglycemic. **Study:** Trigonelline produces hypoglycemic effect in diabetic rats which lasts for 24 hours.[6]

Smilax chinensis
Family: Liliaceae, **Chemical constituents:** It contains beta sitosterol, oil, diosgenin, smilacin, resin, tannin, starch, gum, sarsapogenin, sapogenins, parallin, sarsaponin and saponins. **Medicinal uses:** It is used in inflammation, cancer and type II diabetes mellitus. **Pharmacological activity:** It is anti-inflammatory and anti-diabetic. **Study:** The antidiabetic effects of the methanol extracts of the *Smilax chinensis* L.

(MESC) on alloxan induced hyperglycemia were evaluated on albino wistar rats.

Ethanolic extract of *Smilax chinensis* exhibited potential hypoglycemic effect with potential hypolipidemic effect (Venkidesh et al. 2010) [7,8]. The anti-diabetic effects of the methanol extracts of the *Smilax chinensis* L. on alloxan induced hyperglycemia were evaluated on albino wistar rats. Ethanolic extract of *Smilax chinensis* exhibited a potential hypoglycemic effect with potential hypolipidemic effect.

Salvadora oleoides Decne
Family: Salvadoraceae, **Common name**: Peelu. **Parts used:** Fruit, root, seed. **Medicinal uses:** It is used in anemia, constipation and pyorrhea. **Pharmacological activity:** It is anti-anemic, laxative and anti-septic. **Study:** Yadav et al. reported the hypoglycemic activity of ethanolic extract of *Salvadora oleoides.[9]*

Urginea indica
Family: Liliaceae. **Tibbi name:** Jangli Piyaz. **Chemical constituents:**

It contains glycosides, scillaren A and scillaren B. **Medicinal uses:**

It is used in urinary tract infections and type II diabetes mellitus.

Pharmacological activity: It is anti-septic and hypoglycemic.

Study: The extract of this plant has hypoglycemic activity.**[10]**

Acacia nilotica
Family: Fabaceae; **Local name:** Kikar; **Parts used:** Wood, leave and gum. **Chemical constituents:** It contains gum arabic, tannins, mucilage, magnesium, potassium, calcium, catechin, arabic acid, malic acid and flavonoid compounds. **Medicinal uses:** It is prescribed for treatment of type II diabetes mellitus. **Pharmacological activity:** It is astringent and hypoglycemic. **Study:** Usmanghani et al. documented its anti-diabetic activity.[11]

Achyranthes aspera
Family: Amaranthaceae; **Parts used:** Leaves, stems and roots. **Chemical constituents:** Saponins, ecdysterone, inokosterone, achyranthine, and potassium, ash of leaves, stems and root contains considerable amount of potassium. **Medicinal uses:** It is used in diabetes mellitus. **Pharmacological activity:** It is hypoglycemic. **Study:** A study

was conducted to evaluate its efficacy in diabetic rat. Alcoholic extract of whole plant was given to albino rat. Alcoholic extract exhibited hypoglycemic activity in albino rats. [12]

Luffa aegyptiaca Mill
Family: Cucurbitaceae; **Medicinal uses:** It is used in joint pain, backache, colic, splenitis and phlegmatic diseases. **Pharmacological activity:** It is anti-inflammatory and hypoglycemic. **Study:** El-Fiky et al. investigated the efficacy of oral administration of the ethanolic extracts of *Luffa aegyptiaca* on blood glucose levels both in normal and streptozotocin diabetic rats. Hypoglycemic activity was observed

significantly in streptozocin diabetic rats during the first three hours of treatment. In normal rats, hypoglycemic activity was insignificant compared to glibenclamide treatment.[13]

Citrus paradisi
Family: Rutaceae; **Medicinal uses:** It is used in diabetes mellitus type II and bacterial infections. **Pharmacological activity:** Antibacterial and hypoglycemic. **Study:** Adeneye reported that methanol seed extract of *Citrus paradisi* lowers blood glucose, lipids and cardiovascular disease risk indices in normal Wistar rats.[14]

Aegle marmelos
Family: Rutaceae; **Part used:** Fruits, leaves. **Medicinal uses:** It is used in chronic constipation, piles, dysentery, hyperacidity, abdominal pain and type II diabetes mellitus. **Pharmacological activity:** It is mucilaginous**,** antidiabetic and antidysentric. **Study:** A study was conducted on normal and diabetic rats. Fruit of this plant exhibited hypoglycemic activity in normal rats. [15]

Bougainvillea glabra
Family: Nyctaginaceae, **Parts used:** Leaves, flowers and stems. **Chemical constituents:** It contains alkaloids, flavonoids, pinitol and betacynin. **Medicinal uses:** It is used in inflammation and diabetes mellitus type II. **Pharmacological activity:** It is anti-inflammatory, insecticidal and hypoglycemic.

Study: Bhat et al. reported the antidiabetic properties of *Bougainvillea spectabilis*. This study justifies its use as herbal drug in type II diabetes mellitus [16].

Ferula assafoetida
Family: Umbelliferae. **Chemical constituents:** It contains organic sulphur compounds, volatile oil, foetidae, luteolin. The gum resins contain coumarins, 5-hydroxyumbelliprenin, assafoetidin, ferocolicin, asacoumarin A and B, farnesiferol A, B, C and disulphide, asadisulphide and sec-butylpropenyl disulphide. **Medicinal uses:** It is used in constipation, abdominal pain, cough, intestinal worms, urinary tract infections and sexual disorders. **Pharmacological activity:** It is stimulant, carminative, antispasmodic, expectorant, slightly laxative, anthelmintic, diuretic, aphrodisiac, emmenagogue, nerve and pulmonary surfactant. **Study:** Abu-Zaiton reported the anti-diabetic activity of *Ferula assafoetida* extract in normal and alloxan-induced diabetic rats [17].

Ficus bengalensis
Family: Urticaceae. **Parts used**: Latex, bark, fruits, roots, root bark, buds and aerial roots. **Chemical constituents**: It contains triterpine, friedelin, sitosterol, tigilic acid, quercetin, rutin, tannins, waxes, albuminoids and carbohydrates. **Medicinal uses:** It is used in diabetes mellitus type II. **Pharmacological activity:** It is hypoglycemic.

Study:

Singh et al. reported the antidiabetic effect of *Ficus bengalensis* aerial roots in experimental animals [18]

Cymbopogan citratus
Family: Poaceae; **Medicinal uses:** It is used in type II diabetes mellitus, gouty arthritis and tuberculosis. **Pharmacological activity:** It is anti-inflammatory and hypoglycemic. **Study:** Mirghani et al. documented the hypoglycemic activity.[19]

Aerva lanata
Chemical constituents: It contains galactoside and kampferol. **Medicinal uses:** It is used in kidney stones, constipation and diabetes mellitus type II. **Pharmacological activity:** Diuretic, purgative, emetic and hypoglycemic. **Study:** Vetrichelvan and Jegadeesan reported the anti-diabetic activity of alcoholic extract of *Aerva lanata* in rats and concluded that this plant can be prescribed to treat diabetes mellitus type II.[20]

Laurus nobilis
Parts used: Leaf and berry, **Chemical constituents:** It contains cineole, eugenol, geraniol, alpha and beta pinene, lauric acid, palmitic acid, linoleic acid, reticuline, boldine, laurostearine, methyl eugenol.

Medicinal uses: It is used in hysteria, colic, indigestion, loss of appetite.

Pharmacological activity: It is antirheumatic, antiseptic, bactericidal, digestive, diuretic, emmenagogue, stomachic, hypotensive and sedative.

Study: Khan et al. reported that Bay leaves improve glucose and lipid profile of people with type II diabetes mellitus.[21]

Sesamum indicum
Family: Pedaliaceae. **Tibbi name:** Til, Kunjad. **Chemical constituents:** It contains molybdenum, thiamine, niacin, carbohydrates, methionine, tryptophan, lecithin, sesamin, sesamolin, phytosterol, cobalt, iodine, iron, zinc, calcium and sitosterol. **Medicinal uses:** It is used in cough, sexual debility, asthma, thorax complaints, inflammations and bleeding piles.

Pharmacological activity: It is aphrodisiac, anti-inflammatory and hypoglycemic. **Study:** Takeuchi et al. documented hypoglycemic activity of this plant.[22]

Ginkgo biloba
Family: Ginkgoaceae. **Chemical constituents:** It contains flavonoids and terpenoids.

Medicinal uses: It is used in dementia, intermittent claudication, anxiety, glaucoma, macular degewneration, premenstrual syndrome, cardiovascular disorders and diabetes mellitus type II.

Pharmacological activity: It is hypoglycemic and antioxidant. **Study:** Chen et al. reported that *Ginkgo biloba* extract reduces high-glucose-induced endothelial adhesion by inhibiting the redoxdependent interleukin-6 pathways [23].

Ziziphus mauritiana Lam.
Common names: Beri, **Parts used:** Leaves, fruit. **Medicinal uses:** It is used in type II diabetes mellitus. **Pharmacological activity:** It is hypoglycemic.

Study: Bhatia and Mishra reported the hypoglycemic activity of *Ziziphus mauritiana* aqueous ethanol seed extract in alloxaninduced diabetic mice [24].

Allium cepa L.
Local name: Kashuh, **Parts used:** Leaves and bulbs.

Chemical constituents: It contains phytoncides, vitamins, allicin, flavonoids allylpropyl disulfide, essential oil, quercetin, scordine and fatty oil.

Medicinal uses: It is used in ear pains, flatulence and skin diseases.

Pharmacological activity: It is aphrodisiac and hypoglycemic.

Study:
Mathew and Augusti reported the hypoglycemic activity of *Allium cepa* and concluded that this plant can be prescribed to treat type II diabetes mellitus [25].

Ammi visnaga
Medicinal uses: It is used in angina and type II diabetes mellitus.

Pharmacological activity: It is vasodilator and hypoglycemic.

Study:
Jouad et al. reported the hypoglycemic effect of aqueous extract of *Ammi visnaga* in normal and streptozotocin-induced diabetic rats [26].

Berberis lyceum Royle
Part used: Root, **Medicinal uses:** It is used in arthritis, osteoarthritis, inflammations, opthalmia, mouth ulcers, skin ulcers and conjunctivitis.

Pharmacological activity: It is hypoglycemic and anti-inflammatory.

Study: Gulfraz et al. reported the antidiabetic activity of *Berberis lyceum* root extract and berberine in alloxan-induced diabetic rats [27].

Hippophea rhamnoide L.
Parts used: Fruit, stem, and leaves. **Medicinal uses:** It is used in skin problems, lung problems, cancer, ulcer, wounds, skin infection, joint pain, hair fall, type II diabetes mellitus, and blood pressure, jaundice and heart problems. **Pharmacological activity:** It is antidiabetic.

Study: Arshad and Bibi reported the ethnomedicinal uses of *Hippophea rhamnoide* L. in type II diabetes mellitus [28].

Lavandula stoechas
Arabic name: Mumsik al-Arwah, **Persian name**: Anis al- Arwah, Ustukhudoos.

English name: Arabian Lavender. **Chemical constituents:** It contains fenchone, sitosterol, ursolic acid, lavanol, camphor, and 7-methoxy coumarin. **Medicinal uses:** It is used in neuralgic headache, thoracic diseases and type II diabetes mellitus.

Pharmacological activity: It is deobstuent, resolvent and tonic.

Study: Gamez et al. reported the hypoglycemic activity in various species of the genus Lavandula and concluded that it can be used as hypoglycemic agent in patients with type II diabetes mellitus [29].

Panax ginseng
Family: Araliacaea.

Volume : 4 | Issue : 9 | Sept 2015 • ISSN No 2277 - 8179

Medicinal uses: It is used in asthma, bronchitis, altitude sickness and type II diabetes mellitus.

Pharmacological activity: It is anti-diabetic.

Study: Attele et al. reported the anti-diabetic effects of *Panax ginseng* berry extract [30].

Fagopyrum tataricum
Family: Polygonaceae.

Parts used: Leaves.

Medicinal uses: It is used in diabetes mellitus. **Pharmacological activity:** It is hypoglycemic.

Study: Lee et al. reported that *Fagopyrum tataricum* (buckwheat) improves high-glucose-induced insulin resistance in mouse hepatocytes and type II diabetes mellitus in fructose-rich diet-induced mice [31].

Semecarpus anacardium linn
Family: Anacardiaceae.

Parts used: Fruit, seeds, gum, oil, juice of pericarb, seed kernels.

Chemical constituents: It contains tryptophan, phenylalanine, nicotinic acid, riboflavin, thiamine, bhilanwanol, fixed oil, anacardol, catechol, cardol, anacardic acid.

Medicinal uses: It is used in infected wounds, boils and type II diabetes mellitus.

Pharmacological activity: It is antiseptic and hypoglycemic.

Study: Khan et al. reported the antidiabetic and antioxidant effect of *Semecarpus anacardium* Linn. nut milk extract in a high-fat diet STZinduced type 2 diabetic rat model [32].

Glycyrrhiza glabra
Family: Fabacaea.

Parts used: Roots.

Medicinal uses: It is used in obesity, peptic ulcers, stress, eczema, asthma, hay fever, arthritis, gastritis, abdominal colic, hyperacidity, heart burn, indigestion, constipation, cough, bronchitis and other respiratory infections.

Pharmacological activity: It is expectorant, febrifuge, antibacterial, anti-inflammatory, anti-allergy, estrogenic, demulcent, antispasmodic, laxative, anti-allergic, antacid and antiseptic.

Study: Aoki et al. reported the hypoglycemic activity of this plant [33].

Matricaria chamomilla
Medicinal uses: It is used in headache, chest pain and conjunctivitis.

Pharmacological activity: It is stimulant, demulcent, brain tonic and diuretic.

Study: Cemek et al. reported the antihyperglycemic and antioxidative potential of *Matricaria chamomilla* L. in streptozotocininduced diabetic rats and concluded that it can be prescribed to treat hyperglycemia [34].

New medicines approved by the FDA in the last year represent exciting steps forward in efforts to better treat diabetes.

These include:

- Nesina (alogliptin) is a new DPP-4 inhibitor designed toslow the inactivation of in cretin hormones GLP-1 and GIP, resulting in more active in cretins enabling the pancreas to secrete insulin and better managing blood glucose levels.
- Invokana (canagliflozin) is the first sodium-glucose cotransporter2 (SGLT2) inhibitor approved for patients withtype 2 diabetes.
  SGLT2 inhibitors work in conjunction with the kidneys and the natural urination process to remove excess blood glucose from the body.
- Duetact (pioglitazone/glimepiride) combines two previously approved type 2 diabetes medicines with complementary actions in a single tablet. One medicine targets insulin resistance while the other increases the amount of insulin produced by the pancreas.
- Farxiga (dapagliflozin) is a new SGLT2 inhibitor approved to improve glycemic control in adults with type 2 diabetes.

REFERENCE

A. Shruti S, Sandesh S (2011) Screening of Korean Medicinal Plant Extracts for | Alpha -Glucosidase Inhibitory Activities. Int J Pharm Res 10: 261-264. | | | | | | B. Gao H, Huang Y, Gao B, Xu P, Inagaki C, et al. (2008) α-Glucosidase inhibitory | effect by the flower buds of Tussilago farfara L. Food Chemistry 106: 1195- | 1201. | 1. Jia RY, Yin ZQ, Wu XL, Liu DB, Du YH, et al. (2008) [Hypoglyceminc effect of | flavonoids from Prinsepia utilis on alloxan-induced diabetic mice]. Zhong Yao | Cai 31: 399-403. | 2. Shokeen P, Anand P, Murali YK, Tandon V (2008) Antidiabetic activity of 50% | ethanolic extract of Ricinus communis and its purified fractions. Food Chem | Toxicol 46: 3458-3466. | 3. Rajasekaran S, Sivagnanam K, Ravi K, Subramanian S (2004) Hypoglycemic | effect of Aloe vera gel on streptozotocin-induced diabetes in experimental rats. | J Med Food 7: 61-66. | 4. Okyar A, Can A, Akev N, Baktir G, Sütlüpinar N (2001) Effect of Aloe vera | leaves on blood glucose level in type I and type II diabetic rat models. Phytother | Res 15: 157-161. | 4. Sikarwar MS, Patil MB (2010) Antidiabetic activity of Crateva nurvala stem bark | extracts in alloxan-induced diabetic rats. J Pharm Bioallied Sci 2: 18-21. | 5. Miyazaki H, Matsuura H, Yanagiya C, Mizutani J, Tsuji M, et al. (2003) Inhibitory | effects of hyssop (Hyssopus officinalis) extracts on intestinal alpha-glucosidase | activity and postprandial hyperglycemia. J Nutr Sci Vitaminol (Tokyo) 49: 346- | 349. | 6. Pandiya C, Vohora B (1989) Research and development of indigenous drugs, | Institute of history of medicine and medical research. Hamdard Nagar, New | Delhi, India: 45-49. | | | | 7. Venkidesh R, Mandal SC, Pal D, Lakshmi SM, Saravanakumar A (2010) Antidiabetic | activity of Smilax chinensis in alloxan induced diabetic rats. Phytomed | 2: 51-54. | 8. Rajesh Bhati, Anupama Singh, Vikas Anand Saharan, Veerma Ram, Anil Bhandari | | (2011) Pharmacognostical standardization, extraction and anti-diabetic | activity of Smilax china L. rhizome. A J Trad Med 6: 218-223. | 9. Yadav JP, Saini S, Kalia AN, Dangi AS (2008) Hypoglycemic and hypolipidemic | activity of ethanolic extract of Salvadora oleoides in normal and alloxaninduced | diabetic rats. Indian J Pharmacol 40: 23-27. | 10. The Wealth of India (1976) A dictionary of Indian Raw Material and Industrial products, Volume X, Sp-W, Council of Scientific and Industrial research, New Delhi, India: 87-83. | 11. Usmanghani K, Saeed A, Alam T (1997) Indusyunic Medicine, Department of Pharmacognosy, faculty of pharmacy, University of Karachi: 90-92. | 12. Atta R, Viqar U (1986) Pak Encyclopaedia Planta Medica, Hamdard foundation | Pakistan 1: 56-60. | 13. El-Fiky FK, Abou-Karam MA, Afify EA (1996) Effect of Luffa aegyptiaca (seeds) | and Carissa edulis (leaves) extracts on blood glucose level of normal and streptozotocin | diabetic rats. J Ethnopharmacol 50: 43-47. | 14. Adeneye AA (2008) Methanol seed extract of Citrus paradisi Macfad lowers | blood glucose, lipids and cardiovascular disease risk indices in normal Wistar | rats. Nig Q J Hosp Med 18: 16-20. | | | | | | | | 15. Rastogi P, Mehrotra N (1993) Compendium of lndian medicinal plants, volume | II, (1970-1979) Centrai drug research institute, Lucknow, Publications and information | directorate, New Delhi, lndia: 56-60. | | 16. Bhat M, Kothiwale SK, Tirmale AR, Bhargava SY, Joshi BN (2011) Antidiabetic | Properties of Azardiracta indica and Bougainvillea spectabilis: In Vivo Studies | in Murine Diabetes Model. Evid Based Complement Alternat Med 2011: | 561625 | 17. Abu-Zaiton AS (2010) Anti-diabetic activity of Ferula assafoetida extract in normal | and alloxan-induced diabetic rats. Pak J Biol Sci 13: 97-100. | 18. Singh RK, Mehta S, Jaiswal D, Rai PK, Watal G (2009) Antidiabetic effect of | Ficus bengalensis aerial roots in experimental animals. J Ethnopharmacol 123: | 110-114. | 19. De Bona KS, Bellé LP, Sari MH, Thomé G, Schetinger MR, et al. (2010) Syzygium | cumini extract decrease adenosine deaminase, 5'nucleotidase activities | and oxidative damage in platelets of diabetic patients. Cell Physiol Biochem | 26: 729-738. | 20. Mohammadi J, Naik PR (2008) Evaluation of hypoglycemic effect of Morus alba | in an animal model. Indian J Pharmacol 40: 15-18. | | | | | | | | | | 21. Vetrichelvan T, Jegadeesan M (2002) Anti-diabetic activity of alcoholic extract | of Aerva lanata (L.) Juss. ex Schultes in rats. J Ethnopharmacol 80: 103-107. | 22. Khan A, Zaman G, Anderson RA (2009) Bay leaves improve glucose and lipid | profile of people with type 2 diabetes. J Clin Biochem Nutr 44: 52-56. | 23. Suryanarayana P, Saraswat M, Mrudula T, Krishna TP, Krishnaswamy K, et al. | (2005) Curcumin and turmeric delay streptozotocin-induced diabetic cataract in | rats. Invest Ophthalmol Vis Sci 46: 2092-2099. | | 24. Takeuchi H, Mooi LY, Inagaki Y, He P (2001) Hypoglycemic effect of a hotwater extract from defatted sesame | (Sesamum indicum L.) seed on the blood | glucose level in genetically diabetic KK-Ay mice. Biosci Biotechnol Biochem | 65: 2318-2321. Chen JS, Chen YH, Huang PH, Tsai HY, Chen YL, et al. (2012) Ginkgo biloba | extract reduces high-glucose-induced endothelial adhesion by inhibiting the | redox-dependent interleukin-6 pathways. Cardiovasc Diabetol 11: 49. | 25. Bhatia A, Mishra T (2010) Hypoglycemic activity of Ziziphus mauritiana aqueous | ethanol seed extract in alloxan-induced diabetic mice. Pharm Biol 48: 604- | 610. | 26. Mathew PT, Augusti KT (1975) Hypoglycaemic effects of onion, Allium cepa | Linn. on diabetes mellitus - a preliminary report. Indian J Physiol Pharmacol | 19: 213-217. | | | | | | | | | | 27. Jouad H, Maghrani M, Eddouks M (2002) Hypoglycemic effect of aqueous | extract of Ammi visnaga in normal and streptozotocin-induced diabetic rats. J | Herb Pharmacother 2: 19-29. | 28. Gulfraz M, Mehmood S, Ahmad A, Fatima N, Praveen Z, et al. (2008) Comparison | of the antidiabetic activity of Berberis lyceum root extract and berberine in | alloxan-induced diabetic rats. Phytother Res 22: 1208-1212. | 29. Arshad A, Bibi G (2012) Ethnomedicinal uses of plant resources in Gilgit-Baltistan | of Pakistan. J Med Plants Res 6: 4540-4549. | 29. Gámez MJ, Jiménez J, Risco S, Zarzuelo A (1987) | Hypoglycemic activity in various species of the genus Lavandula. Part 1: Lavandula stoechas L. and | Lavandula multifida L. Pharmazie 42: 706-707. | 30. Attele AS, Zhou YP, Xie JT, Wu JA, Zhang L, et al. (2002) Antidiabetic effects of | Panax ginseng berry extract and the identification of an effective component. | Diabetes 51: 1851-1858. | 31. Lee CC, Hsu WH, Shen SR, Cheng YH, Wu SC (2012) Fagopyrum tataricum | (buckwheat) improved high-glucose-induced insulin resistance in mouse hepatocytes | and diabetes in fructose-rich diet-induced mice. Exp Diabetes Res | 2012: 375673. | 32. Khan HB, Vinayagam KS, Sekar A, Palanivelu S, Panchanadham S (2012) | Antidiabetic and antioxidant effect of Semecarpus anacardium Linn. nut milk | extract in a high-fat diet STZ-induced type 2 diabetic rat model. J Diet 19-33. | | | | | | | 33. Aoki F, Nakagawa K, Kitano M, Ikematsu H, Nakamura K, et al. (2007) Clinical | safety of licorice flavonoid oil (LFO) and pharmacokinetics of glabridin in | healthy humans. J Am Coll Nutr 26: 209-218. | 34. Cemek M, Kaga S, Simsek N, Buyukokuroglu ME, Konuk M (2008) Antihyperglycemic | and antioxidative potential of Matricaria chamomilla L. in streptozotocin- | induced diabetic rats. J Nat Med 62: 284-293. |