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Review Article

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Review on Diabetes and Its Medication

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ABSTRACT

Diabetes mellitus is one of the chronic metabolic disorders. It causes number of complications like retinopathy, neuropathy and peripheral vascular infections. In the worldwide, nearly 2.8% of the population suffers from this disease and it may cross 5.4% by the year of 2025. Oral hypoglycaemic agents like sulphonyl ureas and biguanides are used for the management of diabetes, but they have some side effects so interest is growing on usage of herbal medicines. In Indian systems of medicine, nearly 100 medicinal plants are used for treatment of diabetes. Phyto-constituents like Alkaloids, Flavanoids, Coumarins etc. responsible for antidiabetic activity. In this review focuses out of large no of herbal drugs stated posses to anti-diabetic activity, some of the medicinal plants like *Abelmoschus esculantus*, *Bidens pillosa*, *Carcia papaya*, *Catharanthus roseus*, *Ficus racemosa*, *Gongronema latifolium*, *Michella champaca*, *Oreocinide integrifolia*, *Ruellia tuberosa* *Tamarindus indica*, with their phyto-constituents and other pharmacological effects.

Keywords: Diabetes mellitus, Sulphonyl ureas, Hypoglycaemic, Medicinal plants.

ARTICLE INFO

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1. Introduction

Diabetes mellitus is a disorder of homeostasis characterised by the elevation of both basal and postprandial blood glucose concentration. It affects about 15 million people in United States of America. The major two forms of diabetes

are type-I and type-II. Type-I Diabetes mellitus is autoimmune disease triggered by a viral infection or autoimmune factor it resulting in destruction of B cells to leads to severe insulin deficiency, ketoanemia and

ketoacidosis. It also called as Insulin-dependent diabetes mellitus (IDDM) because it requires exogenous insulin for survival. Type-II Diabetes mellitus is heterogeneous disease of insulin resistant and obesity. It is called non-insulin dependent diabetes mellitus (NIDDM). It can be treated by oral by oral anti diabetic medication. Additional forms of diabetes mellitus include Gestational diabetes which has onset its onset during pregnancy and secondary diabetes which occurs in associated with other endocrine disorders and exposure to drugs or chemical agents that are toxic to pancreas (George and Craig, 2008).

Diabetes is also frequently associated with the development of macro and micro vascular diseases which include neuropathy, nephropathy, cardiovascular and cerebrovascular diseases (Feldman, 1988). In the world wide prevalence of Diabetes for all age groups was estimated to be 2.8% in 2000 and it is increase to be 5.4% in 2025. In India, nearly 30 millions of people are suffered with diabetes (Patel and Srinivas, 1997). Currently a number of therapies are available for diabetes which includes insulin and also different oral anti-diabetic agents like sulfonylureas, biguanides, -glucosidase inhibitors and guanides (Patel and Srinivas, 1997). By using these drugs diabetes mellitus is not completely cured, insulin therapy is beneficial only but it is has draw backs like resistance of insulin, anorexia and fatty liver on long term use (Piedrola et.al., 2001).

Presently, interest is growing on herbal remedies due to the adverse effects and undesirable side effects of synthetic drugs; demand was increased for herbal drugs. Herbal drugs can effectively treat diabetes and are considered as less toxic, fewer side effects and low cost compare to synthetic drugs, so herbal drugs are prescribed (Vershopol, 2002). According to World Health Organisation (WHO), 3.5 billion people depend on medicinal plants for their primary health care (Balick and Cox, 1996).

The WHO recommended the use of herbal medicines because of their effectiveness and minimal side effects, herbal drugs are prescribed widely even their biological compounds not known (Valiathian, 1998). Pharmacological actions of plants products related to their chemical composition. Phyto-constituents like Alkaloids, Flavanoids, Triterpenoids, Phenolic compounds, Coumarins, Polysaccharides, Steroids, Lipids which reduces blood glucose level in humans and animals (Jung et.al., 2006). The Ethanobotanical information reports about 1000 plants may posses anti-diabetic activity and used as folk medicines (Marles and Farnsworth, 1995). In Indian systems of medicines more than 100 medicinal plants are mentioned for treatment of diabetes mellitus which can be used by single or in combinations (Gravel et al., 2002). In this review article it enumerates some medicinal plant species possessing hypoglycaemic properties based on experimental animal models such as *Abelmoschus esculentus*, *Bidens pillosa*, *Carcia papaya*, *Catharanthus roseus*, *Ficus racemosa*, *Gongronema latifolium*, *Michella champaca*, *Oreocinide integrifolia*, *Ruellia tuberosa*

Tamarindus indica, with their phytoconstituents and other pharmacological effects.

2. Description

1. *Abelmoschus esculentus*:

Abelmoschus esculentus is commonly known as Ladies finger it is used as vegetable belongs to the family Malvaceae (subryamanyam et.al., 2011). Traditionally *Abelmoschus* was used in various diseases and medicines such as antidyspepsant (Patro ganesh et.al., 2009), antioxidant (Ansari et.al., 2005), anti ulcer (Gurbuz et.al., 2003) and also used as suspending agent in different formulation (Ravikumar et.al., 2009). Aqueous and ethanolic extracts of *Abelmoschus esculentus* was showed hypoglycaemic activity in alloxan-induced diabetic rats (Dibayajothi Saha, Bindu jain, vibhor jhan, 2011). It contains different chemical constituents like carbohydrates, proteins, Flavanoids, Phenolic compounds, Tannins, Gums and Mucillages (Dibya jyothi saha, Bindu jan, Vibhor jhan, 2011).

2. *Bidens pilosa*:

Bidens pilosa Linn var *radita* it is weed belongs to the family Asteraceae (Farah Deha et. al., 2008). It is a tropical weed present in tropical and subtropical regions. It is widely distributed in pacific region and also Asia including Miyako, Island. Okinawa, Japan (Shinji Nakama et.al., 2012). Aqueous extract of *Bidens pilosa* contain anti-hyperglycaemic effect in streptozocin induced diabetic rats. It significantly decreased blood glucose level and increased serum levels it is mainly due to stimulation of pancreatic islets and increases insulin secretion (Yi-jou tesu et.al., 2009). Ethanolic extract of *Bidens* showing anti-malarial acting against *Plasmodium falciparum* (Brandao et.al., 1997). Other than this *Bidens* used as anti-inflammatory, antiseptic, liver protective (Dimo et.al., 2002) and also anti-microbial and pesticide action, it is a labour facilitates in child birth, (Lango frida et.al., 2008).

Anti-hypertensive (Theophile Dimo et.al., 2002), antiviral specially acting against Herpes simplex virus (Shionji Nakama et.al., 2012). Antioxidant, essential oil of this plant antibacterial and antifungal activities contain (Farah Deba et.al., 2008). This plant mainly consists of phenyl propanoid glucosides, flavanoids, flavanoglycoside. Polyacetylenes and di-terpenes and 44 components are identical in essential oil mainly terpenes (Farah Deba et al., 2008).

3. *Carcia papaya*:

Carcia papaya is a perennial herbaceous plant belongs to the family Carciaceae (Ocagunju et.al., 2009). It is distributed in all of world mainly cultivated in Srilanka, Tanzania, India, Hawaii, Florida, Philippines, South Africa and Australia (Park Milind and Gurditta, 2011). Aqueous seed extract of papaya having hypo-glycaemic and hypolipidemic effect it reduce significant blood glucose level (Adeneye, Olangunju et.al., 2009). This plant contains chemical constituents like Enzymes, Carotenoids, Alkaloids, Flavanoids, Minerals, Vitamins, Glucosinolates (Park Milind, Gurditta, 2011). Traditionally papaya is used in different diseases it contain various medicinal and

pharmacological properties like anti-fertility, antifungal, antiamebic, antimicrobial, anti-malarial, hepato-protective, diuretic, immunomodulator and also used in the treatment of diarrhoea, jaundice, fever and asthma (Krishna *et al.*, 2008).

4. *Catharanthus roseus*:

Catharanthus roseus is shrub it is commonly called as Madagascar periwinkle or Nayanatara belongs to the family Apocynaceae (Karuna *et al.*, 2010). It is cultivated in South Africa, India, U.S.A, Europe, Australia, and Carabean islands (Kokate,2001). *C.roseus* contain nearly 130 Alkaloids mainly Vincristine, Vinblastine, Ajmalicine etc. Dichloromethane: methanol extracts of *Catharanthus roseus* having anti hyperglycaemic effect in alloxan-induced diabetes in rats at the dose of 500 mg/kg body weight for 20 days. Hypoglycaemic effects mainly due to by acting on hepatic enzymes like hexokinase, glucose 6-phosphate, fructose and 1-6-biphosphatase.

C.roseus significantly increased hexokinase enzyme and decreased fructose, 1-6-biphosphatase (Jayanthi *et al.*, 2010). Other than hypoglycaemic effects this plant consists of anti-tumour, antispasmatogenic, antimutagenic, antifertility, antihypertensive, antifungal, anti-inflammatory, anti diuretic, anti-malarial, anti bacterial, antiviral, cardiogenic, CNS depressant and cytotoxic activity (Junaid aslam *et al.*, 2010).

5. *Ficus racemosa* Linn

Ficus racemosa is commonly known as *Ficus glomerata* Roxb belongs to the family Moraceae (Padamaa M prakash, 2008). This plant mainly distributed in Himalayan regions, Punjab, khasia mountain, Chota Nagpur, Bihar, Orissa, West Bengal and Rajasthan (Pcedma M parkas, 2008). *Ficus* species mainly contains chemical constituent like Alkaloids, Carbohydrates, Flavanoids, Glycosides, Saponins, Steroids, Tri-terpenoides, Tannins, Phenols and Fixed oils and Fats (Poongothai *et al.*, 2011).

Ficus racemosa contain hypoglycaemic effect ethanolic extract of *F. racemosa* contain anti-hyperglycaemic and hypolipemic effect in Alloxan-induced diabetic rats. Blood glucose level was decreased by inhibiting endogenous synthesis of lipids probably by penetrating the insulin secretion (Sophia and Manoharan, 2007). Other than this it acts as antioxidant, anti-diarrhoeal, anti-inflammatory, antibacterial, hepato-protective, anti-diuretic, antitussive, analgesic, anthelmintic, anti-cholinesterase wound healing properties and also used in the treatment of bronchitis, smallpox, mumps, heamaturia (Abu Hasanat Zulfiker *et al.*, 2011).

6. *Gongronema latifolium*:

Gongronema latifolium Locally known as uttazi belongs to the family Asclepidaceae (P.A Akah *et al.*, 2019).It is a climber distributed in south Eastern and Asokeke in the South-Western parts of Nigeria (Nwanjo *et al.*,2006).It contain Alkaloids, Flavonoids, Saponins & Tannins (Akuodor *et al.*,2010). Methanolic extract of *G.latifolium* contain significant anti-diabetic activity in alloxan-induced diabetes in rats at the dose of 200-800 mg/kg/day in dose dependent manner (Akah *et al.*,2011).This effect may be

regeneration of islet beta cell following destruction by alloxan (Akah *et al.*,2011). Ethanolic extract of *G.latifolium* leaf having in-vivo schizonticidal activity in blood brain chloroquine sensitive plasmodium berghei in mice (Akdoor *et al.*, 2010).

7. *Michelia champaca*:

Michelia champaca is commonly known as svarna champaca belongs to the family Magnoliaceae. This plant is widely used in Ayurveda and homeopathic medicine such as emenagogue, purgative, inflammation, constipation, astringent, fever, cough, wound healing activity (Dwajani, Tara shanbhag, 2009). Flowers of *Michelia* showed anti-diabetic activity in alloxan induced rats it is significantly reducing blood glucose level (Edwin jarlad, Joshi and Jain, 2002). Whole plant of *Michelia* exhibited broad spectrum antibacterial activity (Khan, Kihara, Omolosa, 2002).

8. *Oreocinide interifolia*:

Oreocinide interifolia is commonly known as tree belongs to the family Utricaceae. It is widely distributed in India, China, Bhutan, Indonesia, Loas maynmar, Skkim and Thailand (Chen *et al.*, 2003).

9. *Ruellia tuberosa*:

Ruellia tuberosa is commonly known as Mimmer root is tropical pernil with hairy stem belongs to the family Acanthaceae. It is a tropical plant and widely distributed in Southeast Asia (Chawan-fwu Lin *et al.*, 2006). Methanolic and n-hexane extract of *R.tuberosa* has hypoglycaemic activity in alloxan-induced diabetic rabbits. These extracts reduced blood glucose level at the dose of 100mg/kg and 150mg/kg (shawara *et al.*, 2011). Other than this it is used as diuretic, antipyretic, analgesic, anti hypersensitive, thirst quenching and antidotal, it is also acts against different bacterial and fungal organisms (Arirudan *et al.*, 2011).

Leaves of *Ruellia tuberasa* contain different chemical compounds like Apigenin and Lutoeolin and seed oil yields Myristic acid, Capril acid and Lauric acid, Flavanoids, Glycosides, Phenols, Saponins and essential minerals with good nutritive value and secondary metabolites (Chawan-fwu Lin *et al.*, 2006).

10. *Tamarindus indica*:

Tamarindus indica Linn commonly known Tammarind belongs to the family Fabeaceae, it is widely distributed Africa and South Asia (Doughari, 2006). Aqueous extract of seeds of tamarind having anti-diabetic activity, it reduces blood glucose level in streptozotocin-induced diabetic male rat at the dose of 100mg/kg. The anti-diabetic activity of *Tamarindus* by significantly decreases activities of glucose-6-phosphate, liver and kidney glutamate transminase (GPT) (Maiti *et al.*, 2004). Ammarindus contain chemical constituents like alkaloids, glycosides, cardiacglycosides, flavanoids, saponins (Naznin and Monirul islam, 2009). Traditionally tamarind used in food preparation it is used to make curries, salads, soups, leaves and fruits are used as vegetables (Emmy De Calve, Katerina Halmova, patricvan Damme, 2010). Other than nutritional values, it is also contain anti neutrinal factors like it acts as antifungal, anti-inflammatory, antiviral, antinumatodal, moluscidal, cytotoxic activity (Emmy De clave, katerina Halmova, Pactrivan Damme, 2010). It is also used in eye

surgery for conjunctival cell adhesion and corneal wound healing (Burgalassi *et al.*, 2010), used in fever, dysentery, jaundice, gastrointestinal disorders (Ferraria, 2005).

3. Conclusion

Diabetes mellitus is a most common endocrine disorder affecting more than 300 million people worldwide. For this, allopathic medicines are developed but which often-limited in efficacy and risk of side effects and cost. In this review, a list of anti-diabetic plants used for management of diabetes mellitus. Treating of diabetes with plant derived compounds has a significant or negligibly side effect, available at low costs. Health professionals, scientists, therapeutics, and scholars working in pharmacology and therapeutics to develop evidence-based alternative medicine to cure different kinds of diabetes in man and animals. More investigations in the fields of isolation and identification of active constituents, preparation of standardised dose and dosage regimen and evaluate mechanism of action of herbal drugs can play a significant role in developing of herbal remedies for anti-diabetic activity.

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