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Complementary Therapeutic Potential: A Focus on Polyherbal Products for Hyperglycemia

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ABSTRACT

Nature has always been stands as a golden mark to amplify the outstanding phenomenon of symbiosis. Ayurvedic remedies for diabetes are usually mixed formulations containing blood sugar lowering herbs in combinations with immunomodulator, detoxicants with the rationale behind such formulations being provided by modern research. Polyherbal formulations have plant-based pharmacological agents which may exert synergistic, potentiative, agonistic antagonistic actions by virtue of its diverse active principles within themselves. These pharmacological principles work together in a dynamic way to produce maximum therapeutic efficiency with minimum side effects. Medicinal plants existing even before human being made their appearance on the earth. The development procedures of herbal drugs for world-wide use has to been different form that of synthetic drugs. The raw materials for Ayurvedic medicines were mostly obtained from plant sources in the form of crude drugs such as dried herbal powders or their extracts or mixture of products or mixture of product. Apart from these systems there has been a rich heritage of Ethno-botanical usage of herbs by various colorful tribal communities in the country. Hence, the present review provides the supportive evidence consideration of a therapeutic approach combining the beneficial effects of Polyherbal preparation in association with adaptive physical activity for effective management of diabetic complications.

Key words: Polyherbal, antidiabetics, hyperglycemia, antioxidant

INTRODUCTION

Diabetes affects about 5% of the global population (Chakrabarti and Rajagopalan, 2002) and management of diabetes without any side effects is still a challenge to the medical system (Rao *et al*., 2003). Diabetes is one of the most common chronic diseases in the world. The number of people with diabetes is increasing dramatically due to population growth, aging, urbanization and increasing prevalence of obesity and physical inactivity that is finally associated with major health and socio-economic problems. The extent and severity of these problems are reflected in extra mortality and at-risk people. For example, according to the last International Diabetes Federation (IDF) report, about 25,66,000 people (6% total population) are suffering from diabetes in Iran and its prevalence is increasing like other developing countries expecting to reach 51,14,900 in 2025 (Sicree *et al*., 2007). Current estimates demonstrate that the world prevalence of diabetes will increase to 7.7% (439 million) adults by 2030. Between 2010 and 2030, there will be a 69% increase in number of diabetic patients in developing countries and 20% in developed countries

(Shaw *et al*., 2010). So, with regard to the issue of socioeconomic burden of diabetes, discovery of more effective and less side effect therapies are necessary. In the recent years good data have been obtained from traditional medicines indicating usefulness of many herbal medicines (Hasani-Ranjbar *et al*., 2008, 2009).

Hyperglycemia, diabetes and oxidative stress: Hyperglycemia is a connector between diabetes with diabetic complications (Brownlee, 2001; Rolo and Palmeira, 2006). In the review of Role and Polmeira (2006) four of the most important molecular mechanisms have been involved in hyperglycemia-induced tissue damage. Hyperglycemia-induced overproduction of superoxide is the causal link between high glucose and the pathways responsible for hyperglycemic damage. In fact, diabetes is typically associated with increased generation of free radicals and/or impaired antioxidant defense qualifications, representing a central contribution for reactive oxygen species in the onset, progression and pathological consequences of diabetes. Besides oxidative stress, some evidence has demonstrated a link between various disturbances in mitochondrial functioning and type-2 diabetes. Mutations in mitochondrial DNA and decreases in mitochondrial DNA copy number have been connected to the pathogenesis of type-2 diabetes (Rolo and Palmeira, 2006). Oxidative stress is increased in diabetes and is more definite in women and this leads to cardiovascular disease (Marra *et al*., 2002). Modifications of life style through increased physical activity and reduced intake of calories can help lower the number of future cases of diabetes (Lakka *et al*., 2002). Early recognition, treatment and prevention of the metabolic syndrome present a major challenge for health care professionals confronting an epidemic of overweight and sedentary lifestyle (Lakka *et al*., 2002).

People with diabetes do not have enough antioxidant defenses (Martin-Gallan *et al*., 2003) but in contrast, too much of the free radical-induced damage can occur. Oxidative stress takes place while oxygen free radicals are produced in a very large amount through the diminution of oxygen. Diverse surveys were intended to establish the levels of stress associated biomarkers in type-I and II (Varvarovska *et al*., 2003).

Medicinal plants and its anti-diabetic potential: Interntional scenario: For a very long time, plants have been an important role part of treatment of many diseases. The use of plants to treat diabetes is a centuries-old practice. More than 400 traditional plant treatments for diabetes have been recorded but only a small number of these have received scientific and medical evaluation to assess their efficacy. Hypoglycemic action from some treatments has been confirmed in animal models and various hypoglycemic compounds have been identified. Traditional treatments may provide valuable clues for the development of new oral hypoglycemic agents and simple dietary adjuncts. *Urtica dioica* (Stinging Nettle) has been used for centuries for food and medical purposes. The species name dioica means two houses because the plant usually contains either male or female flowers. It is abundant in North America, Northern Europe and most of Asia, usually found in the rural area. It contains flavonoids (0.7-1.8%), silicic acid (1-4%), Potassium-ions (0.6%), Nitrates (1.5-3%), volatile oil, Histamine, Serotonin, acetylcholine, formic acid and leukotrienes (LTB4, LTC4, LTD4). The blood sugar lowering effect of *Urtica dioica* has been mentioned in old script such as those written by Avicenna. There have been other reports indicating the benefits of using the infusion or the extract of the leaves or other parts of this plant for the use in diabetes (Ramos *et al*., 1992; Saha *et al*., 2011). Moreover, it is used internally and externally as supportive therapy for prostatic hyperplasia (Prasad *et al*., 2009; Joseph and Jini,

2011), inflammation (Dompeipen *et al*., 2011). Very recently, Mishra *et al*. (2012) reported the ethno-medicinal plants used to cure different diseases by rural folks and tribes.

Medicinal plants and its anti-diabetic potential: Indian scenario: India represented by rich traditional practices, the present research was focused on culture, traditions and natural biodiversity, offers a unique the antibiotic activity of one new species leads to an opportunity for drug discovery researchers (Jachak and Saklani, 2007). Since ancient times, plants have been an exemplary source of medicine. Ayurveda and other Indian literature mention the use of plants in treatment of various human ailments. India has about 45000 plant species and among them, several thousands have been claimed to possess medicinal properties. Many researchers conducted in last few decades on plants mentioned in ancient literature or used traditionally for diabetes have shown anti-diabetic property. Previously, Grover *et al*. (2002) reviewed 45 such plants and their products (active, natural principles and crude extracts) that have been mentioned are used in the Indian traditional system of medicine and have shown experimental or clinical anti-diabetic activity. Indian plants which are most effective and the most commonly studied in relation to diabetes and their complications are: *Allium cepa*, *Allium sativum*, *Aloe vera*, *Cajanus cajan*, *Coccinia indica*, *Caesalpinia bonducella*, *Ficus bengalenesis*, *Gymnema sylvestre*, *Momordica charantia*, *Ocimum sanctum*, *Pterocarpus marsupium*, *Swertia chirayita*, *Syzigium cumini*, *Tinospora cordifolia* and *Trigonella foenum graecum*. Among these, we have evaluated *M. charantia*, *Eugenia jambolana*, *Mucuna pruriens*, *T. cordifolia*, *T. foenum graecum*, *O. sanctum*, *P. marsupium*, *Murraya koeingii* and *Brassica juncea*. All plants have shown varying degree of hypoglycemic and anti-hyperglycemic activity (Table 1).

Table 1: Indian medicinal plants with hypoglycemic activity

Name of the plants	Family
Acacia arabica (Lam.) Muhl. ex Willd.	Mimosaceae
Aegle marmelos (L.) Correa ex Roxb.	Rutaceae
Allium cepa L.	Liliaceae
Allium sativum L.	Alliaceae
Aloe vera (L.) Burm. f.	Aloaceae
Areca catechu L.	Arecaceae
Artemisia pallens Wall. ex DC.	Compositae
Annona squamosa L.	Annonaceae
Andrographis paniculata Nees	Acanthaceae
Aerva lanata (L.) Juss. ex Schult.	Amaranthaceae
Azadirachta indica A. Juss.	Meliaceae
Biophytum sensitivum (L.) DC.	Oxalidaceae
Bombax ceiba L.	Bombacaceae
Beta vulgaris L.	Chenopodiaceae
Brassica juncea (L.) Czern.	Brassicaceae
Barleria lupulina Lindl.	Acanthaceae
Boerhavia diffusa L.	Nyctaginaceae
Cassia auriculata L.	Leguminosae
Caesalpinia bonducella (L.) Roxb.	Cesalpinaceae
Capparis decidua (Forsk.) Edgew.	Capparidaceae
Cajanus cajan (L.) Millsp.	Fabaceae

Table 1: Continued

Name of the plants	Family
Citrullus colocynthis (L.) Schrad.	Cucurbitaceae
Coccinia indica Wight and Arn.	Cucurbitaceae
Casearia esculenta Roxb.	Flacourtiaceae
Catharanthus roseus (L.) G. Don.	Apocynaceae
Camellia sinensis Kuntze	Theaceae
Eugenia uniflora L.	Myrtaceae
Eucalyptus globulus Labill.	Myrtaceae
Enicostemma littorale Blume	Gentiaceae
Biophytum sensitivum	Laksmana
Eugenia jambolana Lam.	Myrtaceae)
Ficus bengalensis L.	Moraceae
Gymnema montanum Hook. f.	Asclepiadaceae
Gymnema sylvestre R. Br.	Asclepiadaceae
Glycyrrhiza glabra L.	Fabaceae
Hibiscus rosa sinensis L.	*Malvaceae*
Helicteres isora L.	Sterculiaceae
Ipomoea batatas (L.) Lam.	Convolvulaceae
Lantana camara L.	Verbenaceae
Mangifera indica L.	Anacardiaceae
Memecylon umbellatum Burm. f.	Melastomataceae
Momordica cymbalaria Fenzl ex Naudin	Cucurbitaceae
Musa sapientum L.	Musaceae
Momordica charantia L.	Cucurbitaceae
Morus alba L.	Moraceae
Murraya koeingii (L.) Spreng.	Rutaceae
Nelumbo nucifera Gaertn.	Nymphaeaceae
Ocimum sanctum L.	Lamiaceae
Picrorrhiza kurroa Royle ex Benth.	Scrophulariaceae
Phyllanthus amarus Schumach. and Thonn.	Euphorbiaceae
Pterocarpus marsupium Roxb.	Fabaceae
Punica granatum L.	Punicaceae
Pterocarpus santalinus L. f.	Leguminosae
Salacia reticulata Wight.	Celastaceae
Salacia oblonga Wall.	Celastaceae
Swertia chirayita (Roxb. ex Fleming) H. Karst.	Gentianaceae
Scoparia dulcis L.	Scrophulariaceae
Syzygium alternifolium Walp.	Myrtaceae
Sida cordifolia L.	Malvaceae
Trigonella foenum graecum L.	Fabaceae
Terminalia catappa L.	Combretaceae
Terminalia pallida Brandis	Combretaceae
Tinospora cordifolia (Willd.) Hook. f. and Thomson	Menispermaceae
Vinca rosea (Catharanthus rosens)	Rroseaseae
Zingiber officinale Roscoe	Zingiberaceae
Zizyphus sativa Gaertn.	Rhamnaceae

Enumeration of antidiabetic plants: Several medicinal plants have found potential use as hypoglycemic in the Indian system of medicines, including ayurveda. Many Indian plants have

been investigated for their beneficial use in different types of diabetes and reports occur in numerous scientific journals. This article aims to provide a comprehensive review on various plant species from Indian biosphere and their constituents which have been shown to display potent hypoglycemic activity. The use of herbs as hypoglycemic is a major avenue in Indian perspectives particularly for treating diabetes which require to be explored more effectively as there are so many literatures available on these aspects. This paper describes the chemistry, activity and usage of the constituents isolated from these plants from India for the treatment of diabetes recorded by Mukherjee *et al.* (2006).

Traditional herbal medicines used for the treatment of diabetes: In recent years, there has been renewed interest in the treatment against different diseases using herbal drugs as they are generally non-toxic and World Health Organization has also recommended the evaluation of the effectiveness of plants in condition where we lack safe modern drugs (Mohseni-Salehi-Monfared *et al.*, 2010). Plant derivatives with hypoglycaemic properties have been used in folk medicine and traditional healing systems around the world (Yeh *et al.*, 2003) from very ancient time. Despite the introduction of hypoglycaemic agents from natural and synthetic sources, diabetes and its secondary complications continue to be a major medical problem to people (Ravi *et al.*, 2005). In addition, Medicinal plants used to treat hypoglycemic and hyperglycemic conditions are of considerable interest to ethnobotanical community as they are recognized to contain valuable medicinal properties in different parts of the plant depicted by very recently (He *et al.*, 2011).

In traditional medicine, diabetes mellitus is treated with diet, physical exercise and medicinal plants, even though, more than 1200 plants are used around the world in the control of diabetes mellitus and approximately 30% of the traditionally used antidiabetic plants were pharmacologically and chemically investigated (Alarcon-Aguilar *et al.*, 2002). Again, Ayyanar *et al.* (2008) studied the potential hypoglycaemic agents have also been detected for more than 100 plants used in antidiabetic therapy. Traditional treatments may provide the valuable clues for the development of new oral hypoglycemic agents and simple dietary adjuncts (Mukherjee *et al.*, 2006). More than 100 medicinal plants are mentioned in the Indian system of medicines including folk medicines for the management of diabetes which are effective either separately or in combinations (Kar *et al.*, 2003). As per the ethnobotanical literature on traditional Phytotherapy of Indian medicinal plants, the species like *Asparagus racemosus butea monosperma*, *Cathanranthus roseus*, *Coccinia indica*, *Gymnema sylvestre*, *Syzygium cumini* and *Momordica charantia* are consistently used by the tribal communities for the treatment of diabetes (Kumarappan *et al.*, 2007) as well as in modern medicine.

The oxidative stress due to free radicals (H_2O_2, oxy radicals O_2^- etc.) lead to many diseases such as atherosclerosis (DeWitt and Hirsch, 2009) and diabetes mellitus (Rahimi *et al.*, 2005). It is essential to counteract this oxidative stress and there by enhance the immunity of body system. Allopathic drugs are available for counteracting the oxidative stress and hence improve immunity but the side effects and prohibitive cost of these allopathic drugs makes it necessary to search for an alternative (Fazeli *et al.*, 2008). The Ayurvedic system of medicines not only provides that alternative but also scores over the side effects and cost factor of allopathic medicine.

Guard Sansar (GS) is a Polyherbal formulation, developed by Pradhan Herbal Company, Bangalore. GS consists of extracts of seven medicinal plants which are *Emblica officinalis*, *Tinospora cardifolia*, *Terminalia arjuna*, *Piper longum*, *Comiphera mukul*, *Nardostachys*

jatamansi and *Boerhavia diffusa as well as corals and asphaltum*. These plant extracts are classified, in ayurveda, as Rasayanas which improve defense mechanism of body and possess antioxidant activity. Earlier studies indicate that *Emblica officinalis* (Sarkhail *et al*., 2007), *Tinospora cardifolia*, *Terminalia arjuna* and *Piper longum* possess immunomodulatory and antioxidant activity (Petlevski *et al*., 2001). As there is a need to generate scientific evidence/prechinical data to support the clinical use of the ayurvedic medicine (s), the present study was undertaken to investigate and to validate the immunomodulatory and antioxidant activity of Guard Sansar.

Current trends in diabetes mellitus: Current available therapies for diabetes include insulin and various oral antidiabetic agents such as sulfonylurea, biguanides, α-glycosidase inhibitors and glinides which are used immunotherapy or in combination to achieve better glycerin regulation (Varvarovska *et al*., 2003). The use of oral drugs is limited due to adverse side effects including hematological, courageous and gastrointestinal reactions, hypoglycemic coma and disturbance of liver and kidney functions in addition, they are not suitable for use during pregnancy (Anam *et al*., 2009). In the treatment of diabetic mellitus non-pharmacologic measures [leg diet, exercise, relaxation therapy, meditation and music therapy remains a critical component of therapy (Shaw *et al*., 2010). To avoid the serious side effects of complementary the therapies, technically another survey of alternative treatments used by patients with diabetes (Mobaseri *et al*., 2009). A part from currently available therapeutic options many herbal medicines have been recommended for the Treatment of diabetes medicinal plants have the advantage of having no side effects (Mohseni-Salehi-Monfared *et al*., 2010).

Effected biological product in diabetes mellitus: Plants have always been utilized as sources of drugs and many of the currently available drugs have been directly or indirectly obtained from plant sources (Jachak and Saklani, 2007). Herbal medicines derived from plant extract are being used to treat a wide variety of clinical disease (Kar *et al*., 2003). More attention has paid to the protective effects of natural antioxidants against drug induced toxicity studies especially whenever free radical generation is involved (Mobaseri *et al*., 2009). Flavonoids have been found to play a very important role in protection against oxidative stress (Said *et al*., 2008).

In accordance with the recommendations of the World Health Organization (WHO) committee on diabetes mellitus it is important to investigate the hypoglycemic actions from plants which were originally used in traditional medicine (Jachak and Saklani, 2007). When the herbal remedies may have recognizable therapeutic effects compared with synthetic drugs, derived from the plants are frumenty considered to be less toxic described by Momtaz and Abdollahi (2010). Therefore, the search for the more effective and safer anti hyperglycemic agents becomes an area of active research.

The effective botanical products are available in capsules and tablets, as well as in other forms, such as water extracts (also called decoctions or infusions), tinctures (hydro alcoholic extracts) and glycerites (glycerin-extracted preparations that are alcohol free). All vary in potency (21) Searching for new antidiabetic drugs from natural plants is still attractive because they contain substances which take alternative and safe effect on diabetes mellitus (Domola *et al*., 2010). Most of plants contain glycosides, alkaloids, terpenoids, flavonoids, carotenoids, etc., that are frequently implicated as having antidiabetic effect (Grover *et al*., 2002).

Status of diabetes mellitus disease in the world: Diabetes is one of the most common chronic diseases in the world. The number of people with diabetes is increasing dramatically due to population growth, aging, urbanization and increasing prevalence of obesity and physical inactivity that is finally associated with major health and socio-economic problems (El-Haouari *et al*., 2007; Ayyanar *et al*., 2008). The extent and severity of these problems are reflected in extra mortality and at-risk people. For example, according to the last International Diabetes Federation (IDF) report, about 2566000 people (6% total population) are suffering from diabetes in Iran and its prevalence is increasing like other developing countries expecting to reach 5114900 in 2025 (Sicree *et al*., 2007; Fazeli *et al*., 2008). Current estimates demonstrate that the world prevalence of diabetes will increase to 7.7% (439 million) adults by 2030. According to Shaw *et al*. (2010), statement between 2010 and 2030, there will be a 69% increase in number of diabetic patients in developing countries and 20% in developed countries. So, with regard to the issue of socioeconomic burden of diabetes, discovery of more effective and less side effect therapies are necessary. In the recent years good data have been obtained from traditional medicines indicating usefulness of many herbal medicines (Hasani-Ranjbar *et al*., 2008, 2009). For a very long time, plants have been an important role part of treatment of many diseases.

More than 400 traditional plant treatments for diabetes have been recorded but only a small number of these have received scientific and medical evaluation to assess their efficacy depicted by Fathi-Azad *et al*. (2005). Hypoglycemic action from some treatments has been confirmed in animal models and various hypoglycemic compounds have been identified It contains flavonoids (0.7-1.8%), silicic acid (1-4%), potassium-ions (0.6%), nitrates (1.5-3%), volatile oil, histamine, serotonin, acetylcholine, formic acid and leukotrienes (LTB4, LTC4, LTD4) reported by Bijan *et al*. (2003). The blood sugar lowering effect of *Urtica dioica* has been mentioned in old script such as those written by Avicenna. There have been other reports indicating the benefits of using the infusion or the extract of the leaves or other parts of this plant for the use in diabetes (Khouri and Golalipour, 2006; Khairandish *et al*., 2009). Moreover, it is used internally and externally as protective activity in beta cells (Golalipour and Khouri, 2007), stereological studies in liver cells (Golalipour *et al*., 2007), then morphological as well as histological alterations in renal and liver depicted by (Golalipour *et al*., 2009a, b) and proliferation of pancreas in diabetic rat (Golalipour *et al*., 2010).

Effects of polyherbal formulations: Polyherbal formulations have plant-based pharmacological agents which may exert synergistic, potentiative, agonistic antagonistic actions by virtue of its diverse active principles within themselves (Table 2). These pharmacological principles work together in a dynamic way to produce maximum therapeutic efficacy with minimum side effects (Sarwar *et al*., 2011; Karou *et al*., 2011). According to Ayruvedic texts, a combination of substances is used to get the enhanced descrbied action and eliminate unwanted side effects (Mukherjee *et al*., 2006). Again, Jeyachandran and Mahesh (2007) have been investigated, antidiabtic and antioxidant values of a polyherbal formulation, Gly-13-C (*Pterocarpus marsupium, Azadirachta indica, Swertia chirate, Curcuma longa Gymmena sylvestre, Emblica officinalis, Eugenia jambolana, Salacia reficulate, Trigonella foenum graecum, Vince rosea, Aegle marmelos* and two minerals viz., processed stannum and processed asphltum in streptozotocin induced diabetic male Wister rats. He also demonstraded that Gly-13-C provided better glycemic control and significantly protected lever tissue against oxidative damage than reference drug.

Table 2: Polyherbal medicinal plants effective on diabetes mellitus

Botanical name	Parts used	Views	Medicinal properties
Curculigo orchioides	Tuber		Piles, jaundice, gonorrhea, bronchitis, diarrhoea, dyspnoea, gleet, hydrophobia, pains in the joints, diabetes, cancer etc.
Scoparia dulcis	Whole plant		Wounds, ulcer, kidney stone skin disease. It increases the activities of plasma insulin, pain killers, stomach troubles, diuretics, fever
Santalum album	Root		Urogenital (internal) and skin (external) antiseptic dysuria and also useful in tuberculosis of gall bladder
Tribulus terrestri	Root		Piles, frequency of urination in diabetes, cystitis andurinary tract infection, enhances sex hormones
Terminalia chebula Retz.	Fruit		Stomach disorders, piles, fistula, chrouic fever, cough, coryza, sore throat, asthma, renal alculi,diabetes
Cuminum cyminum Linn.	Seeds		Antiseptic,anti-spasmedic,antitoxic,bactericidal, diuretic, emmenagogue, nervine, tonic, osteoarthritis, headaches
Ipomoea turpetum L.	Root		It is used in the treatment of diarrhea acne and diabetes

Table 2: Continued

Botanical name	Parts used	Views	Medicinal properties
Trigonella foenum-graecum L.	Seeds		Hypoglycaemic, laxative, parasiticide,restorative, uterine toxic, anticholesterolemic, anti inflammatory, antitumor, antidiabetic
Michelia champaca L.	Flower		Kidney diseases,anti diabetic, nausea and fever. The oil extracted fromtheflowers is locally used in headache, opthalmia, rheumatism and gout
Glycyrrhiza glabra Linn.	Root		Arteriosclerosis, adjusts blood salts, balances bloodsugar, cancer, circulation, colds, flu, heart strengthener, hypoglycemia
Centella asiatica (L) Urban.	Whole plant		Antibacterial, anti-viral, anti-inflammatory, anti-ulcerogenic, anxiolytic, a cerebral tonic, a circulatory stimulant, anidiabetict
Andrographis paniculata Nees.	Whole plant		Sorethroat,hepatitis, dysentery choleradiabetes, influenza, brochitis, swelliugs and itches, piles, diabetes
Withania somnifera	Root		Dehydration, bone weakness, muscle weakness, tensionpremature ageing, parkinsons disease, bone cancer, bipolar disorder, diabetes. diabetes
Salacia obolnga	Root		Antidiabetic, anticancer, antibacterial, antifnngal

Karnim plus, polyherbal formulation containing the *Momordica charantia, ocimum sanctum, Azadirachta indica, Picrorrhiza sanctum* and *Zingiber officinale* has been selected by Martin-Gallan *et al.* (2003). It was helpful in reducing the lipid profile seen in some diabetics in whom hyperglycemia and hyper cholesteriolemia co exist quite. Hence this product has been used as one of the alternative remedy for the treatment of diabetes.

Sitasawad *et al.* (2000) reported that MD-19 is a polyherbal formulation has been screened for antidiabetic activity in alloxan induced diabetes mellitus. MD-19 is a combination of medicinal plants with mineral namely *Momordica muricata, Tinospora cordifolia, Trigonella foenum graecum, Caesalpinia bonducella, Curcuma longa,* along with shilajit (mineral). Treatment of diabetic rats with MD-19 restored the biochemical parameters significantly and it is also proved to be effective in nephrotoxicity and anti hyperglycemic activity (Kusano and Abe, 2000).

Fulzele *et al.* (2002) projected on DRF/AY/5001, an indigenous polyhedral formulation containing medicinal plants such as *Gymnema sylvestre, Syzygium cuimini, Pterocarpous marsupium, Momordica charantia, Emblica officinales, Terminalia beterica, Terminalia chebula* and shudh shilajit (Asphaltum). This formulation has been selected to evaluate the antidiabetic and its related mechanism(s) of action. "Diabrid" a herbal based formulation to evaluate the hypoglycemic activity in mild and moderate diabetes. The herbal constituents of Diabrid contain four indigenous medicinal plants namely *Gymnema sylvestre, Momardica charantia, Eugenia jambolana* and *Trigonella graeceium.*

Furthermore, Hasani-Ranjbar *et al.* (2008) investigated Diabet, a polyherbal formulation intended to use for diabetic patients has been screened for antioxidant activity. The formulation exhibited significant antioxidant activity showing increased levels of SOD, CAT, GPx, GSH and decreased level of LPO.

CONCLUSION

This review studies has been presented cumulative Polyherbal antidiabetic medicinal plants used in the treatment of diabetes mellitus which can provide a comprehensive review on various plant species from Indian biosphere and their constituents. Many Indian plants have been investigated for their beneficial use in different types of diabetes and reports occur in numerous scientific journals. The use of herbs as hypoglycemic is a major avenue in Indian perspectives particularly for treating diabetes. Several new bioactive Polyherbal drugs (Secondary metabolites) isolated from vast kinds of medicinal plants having hypoglycemic effects showed antidiabetic activity commonly with more vibrant as well as most powerful than commonly available oral hypoglycaemic agents such as Daonil, Tolbutamide and Chloropropamide. Though, number of bioactive compounds extracted, isolated and utilized for varieties of medicinal plants have not been well characterized.

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