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Review on antidiabetic activity of herbal drugs

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Abstract
Herbal medicines derived from medicinal plants are used by about 60% of the world's population. More than 400 herbal plants used for the treatment of diabetes mellitus, but only a small number of these have received scientific and medical evaluation to assess their efficiency. Herbal treatments have mostly disappeared in societies, but some are prescribed by practitioner alternative medicine or taken by patients as supplements to conventional therapy. However, plant remedies are the mainstay of treatment in underdeveloped regions. A hypoglycemic action from some treatments has been confirmed in animal models and non-insulin-dependent diabetic patients and various hypoglycemic compounds have been identified. So in this paper, remedies for diabetes mellitus, traditional herbal Antidiabetic drugs and herbs used for the treatment of diabetes mellitus had been discussed. This paper also analyzes the classes of drugs being prescribed by the practitioner and the popular medicinal plants used for diabetes by the participants with their percentages.

Keywords: herbal medicine**,** diabetes mellitus, herbal drugs, antidiabetic, treatment, herbal formulation and diabetes

Introduction

Herbal medicines play a major role in Europe, with Germany, and France leading in over-the-counter sales among European countries, and in most developed countries, one can find essential oils, herbal extracts, or herbal teas being sold in pharmacies with conventional drugs. It is also called botanical medicine or herbal drugs, which refers to the use of any plant's seeds, berries, roots, leaves, bark for medicinal purposes. The World Health Organization (WHO) has listed 21,000 herbal plants, which are used for medicinal purposes around the world[1]. India is the largest producer of medicinal herbs and is called as botanical garden of the world. Herbal medicine is used as an antidiabetic drug. Antidiabetic drugs are medicines developed to stabilize and control blood glucose levels amongst people with diabetes mellitus.

Diabetes mellitus is one of the common metabolic disorders characterized by hyperglycemia due to absolute or relative deficiency of insulin and results in significant morbidity and mortality [2].

Figure 1 explains the major organs affected in diabetes mellitus.

It is linked with the development of various serious diseases, like microvascular (nephropathy, retinopathy, nephropathy), and macrovascular (peripheral vascular disease and coronary heart diseases)[3]. Diabetes mellitus is also known as diabetes, which was observed as diseases related to "sweet urine" and muscle loss. Glucose blood levels are maintained by insulin, which is a hormone released from the pancreas. When these level increases, insulin is produced from the pancreas and maintained the level of glucose. In diabetic patients, the production of insulin is absent or less, which causes hyperglycemia [4].

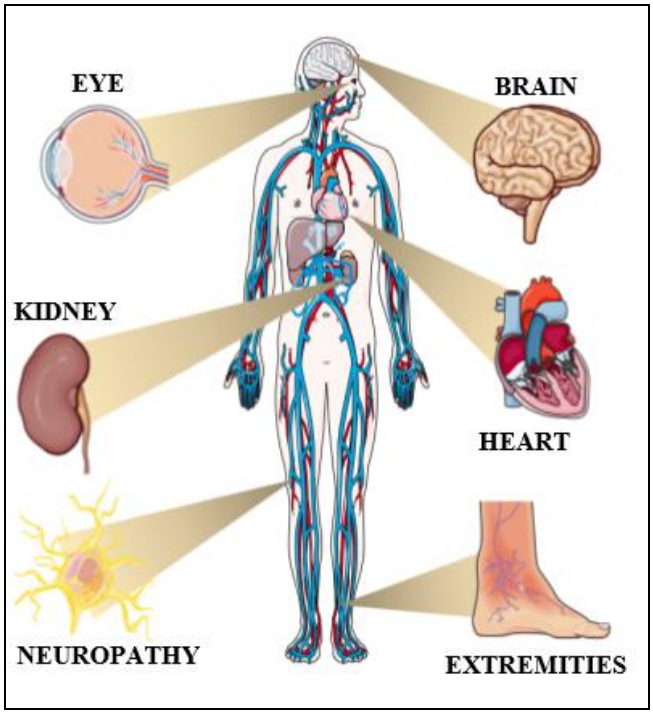

Fig 1: Major organs affected in diabetes mellitus

Diabetes mellitus is of three types: Type 1, Type 2 and gestational diabetes mellitus. Type 1 Diabetes mellitus is known as insulin-dependent diabetes mellitus, which is due to total loss of function of β cell of islets of Langerhans which are present in the pancreas. Type 2 Diabetes mellitus is known as insulin non-dependent diabetes mellitus, which is the temporary loss of β cell mass and it is due to genetic predisposition and mostly occurs in obese persons and

associated with high blood pressure and high cholesterol levels. Gestational diabetes is a type of diabetes, which is present with hyperglycemia in pregnant women. It usually appears in 2-4% pregnancies in the 2nd or 3rd trimester [5]. There are some risk factors for diabetes that people can take these steps to try and avoid, including

- Getting little or no exercise
- Hypertension or high blood pressure
- Obesity or being overweight, especially having excess weight around the midriff
- Heart or blood vessel disease and stroke
- High-density lipoprotein (HDL)
- High levels of the fats called triglycerides [6]

People can reduce the risk of diabetes by altering some of these lifestyle factors, especially by improving their diet and exercise regimen. India is known as the diabetes capital of the world and affects mainly rural and urban people [7]. Decreased exercise, increasing weight and tension, change in diet, malnutrition, alcohol consumption, and viral infection are the major causes of diabetes mellitus in the last 20 years [8]. Female diabetic patients are more compared to male diabetic patients because hormone and inflammation act differently in women. The people who are less educated have diabetes disorder more compared to more educated people [9]. The utmost percentages of people having diabetes are lives in developing countries [10].

Antidiabetic treatment of herbal drugs has become more demand and promising field in the research and medicinal field. Although many researchers analyzed antidiabetic treatment, there are only a few researchers who explored ideas on the antidiabetic treatment of herbal drugs. So in this paper, anti-diabetic treatment of herbal drugs has been reviewed.

Literature Review

There are some evidences that some herbal medicines can lower blood sugar levels. The main herbal medicines are showing good results in proving their efficiency and safety. There are many herbal remedies suggested for diabetes and diabetic complications. Medicinal plants form the main ingredients of these formulations. So in this paper, Section 2.1 explains the remedies for diabetes mellitus, Section 2.2 explains the traditional herbal Antidiabetic drugs, Section 2.3 explains the herbal used for the treatment of diabetes mellitus, and Section 3 explains the results and discussion.

Remedies for Diabetes Mellitus

Treatment of Diabetes mellitus without any adverse effects is still the biggest question to medical practising people. According to world ethano, botanical 800 medicinal plants are used for the prevention of diabetes mellitus. Clinically proven that only 450 medicinal plants possess antidiabetic properties from which 109 medicinal plants have the complete mode of action. There are various ideas available, such as Charaka Samhita and Susruta Samhita, which explain the Phyto-pharmacology features of diabetes and its adverse effect [11]. Herbal drugs permanently cure a person and treat the disease while synthetic drugs are not permanently cured the diseases. Herbal formulations contain natural herbs and fruits and vegetable extracts, which are beneficial in the treatment of various diseases without any adverse effects. Herbal formulations are available without prescription while allopathic medicines are available with prescription [12]. Figure 2 explains the advantages of herbal formulation

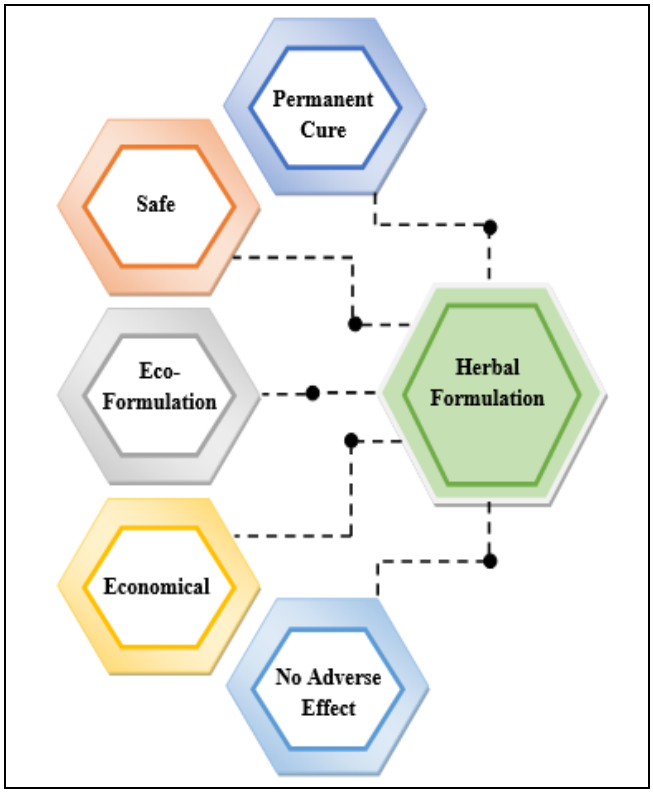

Fig 2: Advantages of herbal formulation

Mushtaq Ahmad, *et al.* [13] explains the herbal remedies used for the treatment of diabetes from district attack. The main aim was to record the ethnomedicinal uses of indigenous plants to control diabetes mellitus. The results showed that the ethnomedicinal survey revealed that 37 plant species belonging to 23 angiosperm families were used to treat diabetes mellitus. Sometimes herbal medicines could cause kidney failure and liver damage in some consumers because they react harmfully with other drugs.

Hira Choudhury, *et al.* [14] described the natural compounds in the remedy of diabetes mellitus. The results showed that treating pre-diabetes or diabetic patients with herbals might be an alternative choice of oral hypoglycaemic effects since it was not only showing benefit in lowering the blood glucose but also helps in improving the lipid profile, antioxidant role, control of hypertension, etc. LDL levels cannot control every time because it was not as effective as glibenclamide. It did not exert any toxic effects.

Maninder Kaur, *et al.* [15] investigated the allopathy for the remedy of diabetes mellitus and antidiabetic herbal formulations. The herbal drugs with antidiabetic activity were extensively formulated commercially because of easy availability, affordability and less side effects. The results showed that there were around 600 herbal drug manufacturers in India of which almost all manufacturers were developing Antidiabetic herbal formulations (AHF) in addition to others. Due to various drawbacks of synthetic antidiabetic drugs, there was a continuous search for alternative therapy in diabetes.

Herbs used as remedy for the diabetes mellitus

There are many herbs and supplements, which are used as a remedy for diabetes. Herbal supplements are products

derived from plants and/or their oils, roots, seeds, berries or flowers. Herbal supplements have been used for many centuries. They are believed to have healing properties. Figure 3 explains the herbs that are used as a remedy for diabetes.

Fig 3: Herbs that Are Used as Remedy for the Diabetes

There are 8 important herbs that serve as a remedy for diabetes mellitus. Herbs include Aloe Vera, Cinnamon, Fenugreek, Gymnema, Bitter melon, Ginseng, Ivy gourd and Salacia oblonga. Table 1 explains the herbs used for the treatment of diabetes mellitus.

Table 1: Types of Herbs used for diabetes mellitus

Author name	Herbs used	Advantages	Limitations
Amira Mourad, *et al.* [16]	Aloe vera	The action of the hypoglycemic agent decreased starch and offered good postprandial glycemic control	Most people could be allergic to the aloe vera gel, caused by skin allergies, redness in the eyes, skin rashes, irritation and burning sensation
Ranabir Chanda, *et al.* [17]	Bitter Melon	Bitter melon contained bioactive compound i.e., lectin that had insulin-like activity, which helped in diabetes	Sometimes these herbs caused diarrhoea, vomiting and other intestinal issues
Farzaneh Hasanzade,*et al.* [18]	Cinnamon	Cinnamon could decrease blood glucose in diabetes	Overtake of Cinnamon could increase the risk of cancer
Subhasish das,*et al.* [19]	Fenugreek	Pectin of fenugreek seeds slowed down glucose absorption from the gastrointestinal tract	Fenugreek could cause nasal congestion, coughing, wheezing, facial swelling, and severe allergic reactions
Morris Karmazyn,*et al.* [20]	Ginseng	Ginseng contained formulations that could produce beneficial effects in terms of normalization of blood glucose levels	It was safe to consume, but some people faced headaches, diarrhoea and rapid heartbeat
Matthew j. leach,*et al.* [21]	Gymnema	Gymnema might improve glycemic control by stimulating insulin release from the pancreatic islets of Langerhans	This could cause side effects, such as headache, nausea, lightheadedness, and dizziness.
Anura V Kurpad,*et al.* [22]	Ivy gourd	These herbs could reduce stress and hypertension, also could help with diabetes	There were some side effects mild and might include headache, nausea, or dizziness
Shankaranarayanan Jeykodi,*et al.* [23]	Salacia oblonga	Mixing salacia with tea might lower the glycated haemoglobin levels	It also showed side effects of diarrhoea and headache

Yiyi Zhang, *et al.* [24] explained the efficacy of aloe vera supplementation as a remedy for diabetes. A total of five randomized controlled trials (RCTs) involving 415 participants were included. The results showed that the aloe vera might reduce the levels of FBG, HbA1c, triglyceride, TC and LDL-C, and increase the levels of HDL-C in diabetes and early non-treated diabetic patients. The variation in daily dosages made it difficult to determine the minimum effective dose of aloe vera that can cause a blood glucose reduction.

Kathy Abascal, *et al.* [25] described the bitter melon as a remedy for diabetes mellitus. Bitter melon (Momordica charantia) was a complex plant medicine that had a remarkably long history of use, both as a food and as a medicine. The results showed that the seeded fruit had a Long history of use as food eaten with some frequency, and aqueous extracts of bitter melon appear to have a significant hypoglycemic effect. Sometimes, these plant leaves show symptoms of diarrhoea and intestinal issues.

Thushari Bandara, *et al.* [26] investigated the bioactivity of cinnamon as a remedy for diabetes mellitus. Available in vitro and in vivo evidence indicates that cinnamon might have multiple health benefits, mainly in relation to hypoglycaemic activity. The results showed that the variability of the available publications could be due to the species used, the sampling techniques (collection, storage and method of grinding, etc.), methodological differences of extractions, differences in the controls used and their glucose-lowering drugs. The over intake of cinnamon leaves might lead to a risk of cancer.

Arpana Gaddam, *et al.* [27] explained the role of fenugreek as a remedy for diabetes mellitus. Numerous herbs were considered to possess antidiabetic activity. The results indicated that the fenugreek showed hypocholesterolemic effects by reducing LDLc levels but without affecting serum TG, HDLc levels. Hypoglycemic effects were due to increasing levels of serum insulin. There was a side effect of the fenugreek leaves, like asthma, low blood sugar and loss of consciousness.

Wei Chen, *et al*. [28] described the uses of ginseng as a remedy for diabetes mellitus. The anti-diabetic of ginseng was positive for diabetic patients but had no significant impact on or healthy adults. The results showed that the ginseng had a protective on the pancreas and improves the production/secretion of insulin. The physical activity, body weight, diabetic degree, and sample size of volunteers might affect the outcomes of clinical trials. Some people faced headaches, diarrhoea, and rapid heartbeat when consuming more ginseng leaf in tea.

Vinay Kumar Singh, *et al*. [29] explained the Gymnema Sylvestre as a remedy for diabetics. The leaves of the plant, which were consumed orally for the treatment of diabetes in ayurvedic medicine, were also known to lower serum cholesterol and triglycerides. The results showed that the transition mechanisms of Gymnema Sylvestre extracted in blood and modes of metabolic action on carbohydrates and lipids. Sometimes, this would cause side effects, such as headache, and dizziness.

Dr. AP Attanayake, *et al*. [30] described the ivy gourd as a remedy for diabetes. The therapeutic potential of ivy gourd against diabetes was brought mainly by its antihyperglycemic, β-cell regenerative, antihyperlipidemic, and antioxidant properties. The results showed that the aqueous leaf extract of C. grandis exert antihyperglycemic, antihyperlipidemic, antioxidant activities in vivo merits its use in the development of potential medicines against diabetes mellitus. There were some mild symptoms, like headache, nausea and dizziness.

Raghuveer C.V, *et al.* [31] explained the Salacia Oblonga as a remedy for diabetes in Streptozotocin. The main aim was to evaluate the effects of standardized hydroalcoholic root extract of S. Oblonga (SOE) on the random blood glucose (RBG), plasma Glycated haemoglobin (HbA1c) and the serum insulin levels. The results showed that the antihyperglycemic effect was proven by the decreased RBG and HbA1c and the increased insulin levels. The possible insulinogenic effect was indicated by the increased insulin levels. When consuming the leaves of Salacia, some people reported symptoms of diarrhoea and headache.

Traditional herbal antidiabetic drugs

The Indian traditional system of medicine was full of the use of plants for the management of diabetic conditions. According to the World Health Organization, up to 90% of the population in developing countries uses plants and their products as traditional medicine for primary health care [32]. Traditional herbal drugs with multiple Phyto-constituents and properties have been used as medicines for the treatment of a wide range of diseases [33]. Table 2 explains the traditional herbals used as antidiabetic drugs.

Table 2: Traditional herbals used as antidiabetic drugs

Author name	Traditional herbs used	Advantages	Drawbacks
Reetesh Malvi, *et al.* [34]	Allium sativum	Allium sativum possessed a beneficial potential to reduce blood sugar, cholesterol and triglycerides	Breath and body odor, upset stomach, or heartburn might occur as side effects
Mandee Pantier, *et al.* [35]	Aloe barbadensis	The leaves and their bitter principles exhibited effects on blood glucose level in normal and alloxan-induced diabetic	Blood sugar, burning and itching of the skin were some of the side effects
Muhammad Fazal Hussain Qureshi, *et al.* [36]	Azadirachta indica	The leaves were impaired glucose tolerance or reduced the number and activity of signalling molecules of insulin	There were serious side effects include vomiting, diarrhoea, drowsiness, blood disorders, seizures, and loss of consciousness.
T Thirumalai, *et al.* [37]	Brassica juncea	These herbs were commonly used to treat diabetes of blood glucose level.	Common cold, painful joints and water retention were some of the side effects.
Juan C Díaz-Zagoya, *et al.* [38]	Carica papaya	These herbs showed the benefit of a tight blood glucose control which reduces microvascular and macrovascular complications	Severe stomach pain, vomiting and slow heartbeat were the side effects
Leena Muralidharan [39]	Catharanthus roseus	These herbs decreased blood glucose levels and had brought down TC, LDL, VLDL, and TG close to normal level	It could cause side effects, such as nausea, vomiting, hair loss, hearing loss, dizziness, and bleeding.
G.f. Perpetuo, *et al.* [40]	Mangifera indica	It showed a significant decrease ($p < 0.05$) in blood glucose level in comparison to the diabetic controls eating a diet containing 0% mango.	Excessive intake of blood sugar levels could be increased due to which diabetes could occur. High intake could increase the heat in the body
Suchitra Kumari, *et al.* [41]	Momordica charantia	Fasting Plasma glucose level, Glycosuria, Oral glucose tolerance, and Hb A1C were measured as the outcome variables	Liver damage, vaginal bleeding and intestinal issues were some of the side effects
Peter Giovannini, *et al.* [42]	Carica papaya	These herbs were useful for tight blood glucose control, which reduces microvascular complications	Abdominal pain, vomiting and inability to move were the side effects
Kirti Chauhan, *et al.* [43]	Catharanthus roseus	These herbs help in lowering down the blood pressure and some help in providing the treatment of cancer, etc.	There were some side effects, such as hearing loss, dizziness and bleeding.
Subhasis Samanta, *et al.* [44]	Mangifera indica	The stem and bark of the plant had antioxidant, anti-inflammatory, and Immuno-modulator activities had been formulated in various food supplements	High intake could increase the heat in the body

Rizwan Ashraf, *et al*. [45] explained the allium sativum (garlic) supplementation with the standard antidiabetic agent that provides better diabetic control for diabetes mellitus. The main aim was to evaluate the potential hypoglycemic effects of garlic in diabetic patients. The results showed that the allium sativum was found to produce hypoglycemic effects by sparing insulin inactivation from the sulphydryl group. Although garlic was assumed safe and recommended for many common ailments since ancient times, too much utilization of garlic can cause problems.

S. Rajasekaran, *et al*. [46] described the hypoglycemic effect of aloe vera (Aloe barbadensis) gel in induced diabetes in experimental rats. The effect of aloe vera gel on blood glucose of normal fasted rats, on glucose tolerance, and on carbohydrate metabolism in streptozotocin (STZ)-induced diabetic rats was evaluated. The results indicated that the increase in glucose-6-phosphatase and fructose-1, 6-bisphosphatase resulted in a decrease of glycolytic flux. It was evident that Aloe vera at both concentrations did not produce any significant change in blood glucose level in normal fasted rats.

Dr Nagashayana G, *et al*. [47] investigated the evaluation of the hypoglycemic activity of neem (Azadirachta indica) in albino rats. The results indicated that the neem oil had got potential to reduce the blood glucose levels within a short period of time and also it had the potential to improve the glucose tolerance after a treatment period of 4 weeks, as suggested by the oral glucose tolerance test. There were serious side effects include vomiting, diarrhoea and drowsiness.

Vijay kumar valavala, *et al*.[48] described the effect of mustard (Brassica juncea) leaf extract on Brassica juncea. Reversal of changes associated with hyperglycemia, delayed cataract progression and maturation were observed. The results showed that the activity of SDH was elevated in diabetic rats leading to increased availability of fructose and that fructose was a 10-fold better substrate than glucose for glycosylation. Common cold, painful joints and water retention were some of the side effects.

Lawrence Leung, *et al*. [49] explained the Antidiabetic and hypoglycemic effects of Momordica charantia. Abundant pre-clinical studies had documented the antidiabetic and hypoglycemic effects of M. charantia through various postulated mechanisms. The results showed that 18% mean reduction both in fasting and postprandial sugar levels across 86% of all subjects. The MC seeds contain a lectin, which could inhibit protein synthesis in the intestinal walls of an animal model but they produced no gastrointestinal symptoms in humans, except for a report of headache.

Herbal Used For the Treatment of Diabetes Mellitus

Recently, new active medicines have been extracted from plants and possess antidiabetic activity with more effectiveness than oral hypoglycemic agents used in proven therapy. Awareness has been drawn towards the discovery of plants with the antidiabetic activity that may be useful to people. It may also provide evidence for the improvement of a new herbal drug for the treatment of diabetes mellitus. Table 3 explains the herbals used for the treatment of diabetes mellitus.

Table 3: Herbals used for the treatment of Diabetes Mellitus

Author name	Plant species	Parts used	Active constituents	Mode of action
John L. Sievenpiper, *et al*. [50]	Curcuma longa	Powdered form	α-phellantrene, tripinolene	Lowers blood sugar, increases glucose metabolism and potentiates insulin activity
Mohd Wais, *et al*. [51]	Terminalia catappa	Petroleum either fruit extract	Omega-9 fatty acid	Decrease the blood glucose level
Ahmad Ghorbani, *et al*.[52]	Punica grantum	Methanolic seed extract	Punicalagin, punicalin	Decrease of glycemia
Ijomone Oghogho Rosalie, *et al*. [53]	Panex ginseng	Root extract	Ginsenosides protopanaxadiol	Inhibit α - glycosidase activity and decrease glucose absorption
Gebreselema Gebreyohannes,*et al*.[54]	Momordica charantia	Fresh green leaves	Charantin, sterol	Activates PPARs α and y and lower the plasma apo β-100 in mice fed with high-fat diet
M.A. Jafri, *et al*.[55]	Coccinia indica	Ethanolic extract of the whole plant	Glutamic acid, Asparagine	Lower blood glucose level due to suppressed glucose synthesis.
G Arumugam, *et al*.[56]	Catharan thus roseus	Hot water decotis on the leaves	Catharanthaine, vincristine and vinblastine	Lowering of glycemia
Mohamad Andrie, *et al*. [57]	Carica papaya	Aqueous seed extract	Papain, chymopapin	Lowered fasting blood sugar, triglyceride and total cholesterol

Rohit Kumar Verma, *et al*. [58] explained the herbal medicines (Commiphora mukul, Cyperus rotundus and Areca catechu) used as the treatment for diabetes mellitus. The results showed that the herbal products from Indian medicinal plants have been widely used to treat diabetes, and it was important to understand how these natural medicines from traditional medicinal plants act. These herbal medicines showed some side effects gastrointestinal symptoms in humans and headache.

Nidhi Aggarwal, *et al*. [59] investigated the Medicinal Herbs (Azadirachta indica and Pterocarpus marsupium) used as the treatment of diabetes mellitus. The results showed that the rhizome extract of the plant was showed to lower blood glucose; administration of curcumin reduced the blood sugar, hemoglobin, and glycosylated hemoglobin levels significantly, partially reversed the abnormalities in plasma albumin and urea. These medical herbs showed medical symptoms, such as diarrhoea, stomach upset and headache.

Kasi ravi, *et al*. [60] described the protective Effect of Eugenia jambolana Seed Kernel as the treatment of diabetes mellitus. The results showed that the reduction in the activity of these enzymes might result in a number of

deleterious effects. Administration of EJs-kernel increased the activity of enzymes and might help to avoid the free radicals generated during diabetes. These herbs show some side effects, such as diarrhoea, constipation, swelling, sore mouth and throat, and skin ulcers.

Results and Discussion

This section explains the classes of drugs being prescribed by the practitioner for diabetes mellitus and the popular medicinal plants used for diabetes by the participants for diabetes mellitus.

Classes of drugs include Biguanides [61], Sulfonylureas [62], Gliptins [63], Oral combination [64], and Lemon-grass [65]. Table 4 explains the drugs prescribed for the treatment of diabetes mellitus.

Table 4: Drugs prescribed for the treatment of diabetes mellitus

Classes of drugs	Percentages (%)
Biguanides [61]	62%
Sulfonylureas [62]	14%
Gliptins [63]	6%
Oral combination [64]	2%
Insulin [65]	32%

Biguanides are a class of diabetes medications that are used for people with Diabetes (Example: Metformin), Sulphonylureas are a class of oral medications that control blood sugar levels in patients with diabetes by stimulating the production of insulin in the pancreas and increasing the effectiveness of insulin in the body (Example: glimepiride), Gliptins are a novel class of oral anti-diabetic agent that enhance and prolong the physiological actions of in certain hormones by competitively. Figure 4 explains the classes of drugs being prescribed by the practitioner for diabetes mellitus.

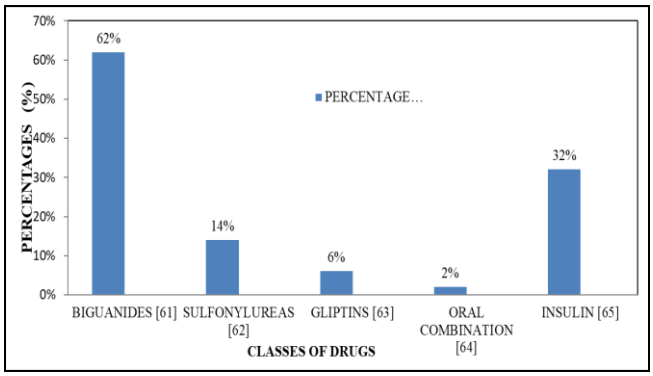

Fig 4: Classes of drugs being prescribed by the practitioner for diabetes mellitus

Biguanides drugs showed a higher percentage (62%) when compared to other drugs (Sulfonylureas, Gliptins, Oral combination and Insulin) prescribed by the practitioner for diabetes mellitus.

Oral combination drugs showed a lesser percentage (2%) when compared with the other drugs (Biguanides, Sulfonylureas, Gliptins and Insulin).

There were many medicinal plants for the treatment of diabetes mellitus reported by the participants. Medicinal plants include Moringa leaves and seeds, Black plum bark, Okras, Avocado seeds, and lemongrass. Figure 5 explains the popular medicinal plants for diabetes reported by the participants.

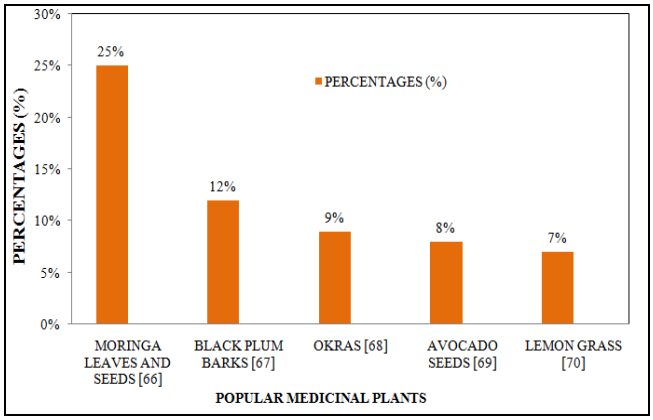

Fig 5: Popular medicinal plants for diabetes reported by the participants

Moringa leaves and seeds [66] showed a higher percentage (25%) when compared with the other medicinal plants (Black plum barks [67], Okras [68], Avocado seeds [69] and Lemongrass [70]). Lemongrass showed a lesser percentage (7%) when compared with the other medicinal plants (Moringa leaves and seeds, Black plum barks, Okras and Avocado seeds).

Conclusion

Diabetes mellitus is the most common endocrine disorder, affecting millions of people worldwide. It is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The increase in resistance and populations of patients at some risk, in conjunction with the restricted number of commercially available drugs for diabetes that still in present have many side effects and also problems, like unwanted hypoglycemic effects, are the cause to shift the research towards traditionally available medicine, which have low side effect. In this paper, remedies for diabetes mellitus, traditional herbal Antidiabetic drugs, and herbs used for the treatment of diabetes mellitus had been discussed. This paper also analyzes the classes of drugs being prescribed by the practitioner for the treatment of diabetes mellitus and the popular medicinal plants used for diabetes by the participants with their percentages. These medicinal herbs and herbal drugs help in the treatment of antidiabetic, but these medicinal herbs and herbal drugs show many side effects. So in future, if there are many herbs identified for the treatment of diabetes mellitus, it should be with fewer side effects.

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