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Exploring the Medicinal Properties of Traditional Indian Medicine for Treating Diabetes Mellitus-2

Shristi Kumari[1], Surya Pratap Singh[2], Sagar Tiwari[3], Dr. Nakul Gupta[4], Bhawna Shridhar[5]
[123]*Scholar, IIMT College of Pharmacy, Greater Noida, India*
[4]*Director, IIMT College of Pharmacy, Greater Noida, India*
[5]*Assistant Professor, IIMT College of Pharmacy, Greater Noida, India*

Abstract: ***Type 2 diabetes mellitus (T2DM) is a group of metabolic disorder and a pandemic. It is difficult to manage. The treatment for Type 2 diabetes mellitus (T2DM) concerned with lifelong medicines, lifestyle modifications such as diet and exercise but T2DM can be prevented. To reduce new cases of diabetes it is key way to control it globally. Many reaserchers have been studying medicinal plants as supplements to prevent and manage T2DM. One such plant product is curcumin, which comes from the turmeric plant (Curcuma longa). Curcumin is a natural active compound with many health benefits proven in lab and animal studies. These include antioxidant, anti-inflammatory, heart-protective, liver-protective, kidney-protective, immune-boosting, infection-fighting, cancer preventive, blood sugar–lowering, and joint pain–relieving effects. In animal studies, curcumin has been shown to delay the development of diabetes, improve the working of pancreatic β-cells (which produce insulin), protect them from damage, and reduce insulin resistance. At various times, measurements have been made of the plasma insulin concentration, insulin generalization variable, and blood sugar level. Because they are readily available in India, medicinal plants such as aloe vera, garlic, Tulsi, bitter melons, and neem have been chosen for their proven anti-hyperglycaemic qualities. Mathematical solutions were calculated for every plant and proved to be steady.***
Keywords: ***Type 2 diabetes mellitus, medicinal plants, metabolic disorders, insulin.***

I. INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a group of metabolic diseases that has become very common worldwide, almost like a pandemic. Because it has many causes, managing it is difficult. Treatment usually requires lifelong medicines along with lifestyle changes such as diet and exercise. The good thing is that T2DM can often be prevented. So, reducing new cases of diabetes is an important way to lower its global impact. Recently, researchers have been studying medicinal plants as supplements for both preventing and managing T2DM. [1-3]. Diabetes mellitus is a chronic metabolic disorder broadly classified into Type 1 and Type 2. In Type 1 diabetes, autoimmune destruction of pancreatic β-cells leads to insufficient insulin production. In contrast, Type 2 diabetes is characterized by insulin resistance, where insulin is secreted but not effectively utilized by body tissues [11]. Both conditions result in elevated plasma glucose levels, which, if persistently above 120 mg/dl, may cause long-term complications such as nephropathy and other systemic disorders. [18]. Current therapeutic strategies include allopathic interventions and traditional approaches such as ayurvedic medicine. Medicinal plants play a significant role in diabetes management due to the presence of bioactive phytochemicals (e.g., alkaloids, flavonoids, tannins), which exhibit glucose-lowering properties. [3, 16, 19].

Several mechanisms of action have been identified:

1) DPP4 inhibition, which prolongs the activity of GLP-1 and GIP, thereby enhancing insulin secretion and suppressing glucagon. Plant extracts such as *Camellia sinensis, Syzygium spp., Artocarpus heterophyllus, Lagerstroemia speciosa, and Persea americana* have demonstrated this activity.
2) Improved insulin sensitivity in peripheral tissues, allowing more effective glucose utilization.
3) Restoration and protection of pancreatic β-cells, contributing to long-term glycaemic control [21, 22].

GLP-1, secreted by L-cells in the gastrointestinal tract, plays a critical role in regulating insulin release and reducing glucagon production in the presence of glucose [35].

In this study, we evaluated the therapeutic potential of Aloe vera, Gurmar *(Gymnema sylvestre),* Garlic *(Allium sativum),* Tulsi *(Ocimum sanctum),* and other medicinal plants. A mathematical modeling approach, based on differential equations and graphical analyses, was employed to quantify their effects on glycemic control [19, 29]. The results provide a comparative framework, highlighting the scientific basis of traditional remedies and their relevance in modern diabetes management.

II. EPIDEMIOLOGY OF DIABETES MELLITUS

The word mellitus comes from Latin and means “sweet like honey,” because sugar is present in urine. The word diabetes comes from Greek, meaning “to pass through,” which describes frequent urination and excessive thirst [11]. In ancient India, doctors described a disease called Madhumeha in which the patient had sweet urine and a sweet body odor. They noticed that ants would gather around urine spots of such patients. According to the World Health Organization (WHO), by 2025 more than 300 million people will have diabetes. [33,30].

III. CLASSIFICATION OF DIABETES MELLITUS

Type I Diabetes: Also called insulin-dependent or childhood-onset diabetes. It happens when the body cannot produce insulin.
Type II Diabetes: Also called non-insulin-dependent or adult-onset diabetes. It usually develops later in life.
Gestational Diabetes (Type III): This type develops for the first time during pregnancy [11,12,13].

IV. TREATMENT OF DIABETES MELLITUS

Insulin therapy tries to copy the natural way the body works- controlling blood sugar after meals and preventing very low sugar between meals. Different types of insulin are available, such as human, cow, and pig insulin. However, wrong doses or poor coordination between meals and insulin injections can cause problems like weight gain and hypoglycemia (low blood sugar) [16].

V. ROLES OF MEDICINAL PLANTS IN DIABETES MANAGEMENT

Medicinal plants play a significant role in the treatment of diabetes mellitus which is a serious metabolic disorder. Traditional plants are reported to have significant anti-diabetic properties with no harmful side effects. They are rich sources of anti-diabetic compounds such as flavonoids, alkaloids, phenolic and tannins that improve the efficiency of pancreatic tissues by increasing the insulin secretion or decreasing the intestinal absorption of glucose. Literature suggests that there are approximately 410 experimentally proven medicinal plants with anti-diabetic properties out of which the complete mechanism has been studied only for 109 plants. Several medicinal plant extracts have been shown to modulate the metabolic pathways such as glycolysis, gluconeogenesis, Krebs cycle, glycogen synthesis and their degradation, synthesis and release of insulin, cholesterol synthesis, carbohydrate metabolism and absorption. The treatments of diabetes include diet, exercise, use of oral hypoglycemic agents and insulin is the primary forms of treatment for diabetes. Currently available synthetic antidiabetic agents besides being expensive produce serious side effects. Apart from currently available therapeutic options, many herbal medicines have been recommended for the treatment of diabetes mellitus. Medicinal plants have the advantage of having no side effects. Traditional plant treatments have been used throughout the world for the therapy of diabetes mellitus. History showed that medicinal plants have been used in traditional healing around the world for a long time to treat diabetes; this is because such herbal plants have hypoglycemic properties and other beneficial properties, as reported in scientific literatures. This review clearly shows the importance of herbal plants in the treatment of diabetes mellitus. India has an officially recorded list of 45,000 plant species and a various estimation of 7500 species of medicinal importance. India has a rich history of using various potent herbs and herbal components for treating diabetes. Many Indian plants have been investigated for their beneficial use in different types of diabetes and reported in numerous scientific journals. In this review, there are 10 plants belonging to 30 families described about their uses in curing diabetes. [4, 6, 19,33,34]. More than 300 plant species are known to have blood sugar-lowering (hypoglycemic) effects, according to many research reviews [1, 19, 34].

1) Ginger: Ginger *(Zingiber officinale),* with wide use as a spice and therapeutic herb, attracted attention for its potential antidiabetic properties. It contains chemical compounds like gingerol, paradol, shogaol which contribute to its pharmacological effects. Animal and cell culture experiments have demonstrated the efficacy of ginger extracts or isolated compounds in reducing blood sugar, improving sensitivity to insulin and ameliorating diabetic complications such as neuropathy and nephropathy. These effects have been attributed to various mechanisms, including enhanced insulin signalling, inhibition of gluconeogenesis and modulation of lipid metabolism. Ginger when consumed as culinary ingredient or as dietary supplement has attained safety window. However, ginger may showcase gastrointestinal adverse effects such as heartburn and bloating in some individuals if used in larger doses. Additionally, ginger may interact with certain medications, including anticoagulants and antidiabetic drugs, potentially altering their effects [47-51].
2) Fenugreek: Fenugreek *(Trigonella foenum-graecum)* being one of the most widely studied. Fenugreek, a member of the Fabaceae family, has been used since antient times for its medicinal properties. Fenugreek contains bioactive compounds such as trigonelline, galactomannan and saponins, contributing to its pharmacological effects. Fenugreek shows promising effects as a natural and complementary therapy for diabetes management, offering multiple mechanisms of action and extensive clinical

evidence supporting its efficacy. Through its effects on insulin sensitivity, insulin secretion, carbohydrate metabolism and inflammation, fenugreek helps improve glycaemic control and mitigate diabetic complications. A new amino acid found in fenugreek seeds, there is antioxidant activity in this plant [52-55]

3) Neem: Neem *(Azadirachta indica)*, a all-rounder and a tree with Indian origin, used since centuries in Ayurveda for various health ailments. Neem contains a diverse array of flavonoids, triterpenoids and polysaccharides, which contribute to pharmacological effects. Neem is safe for consumption when used in small amounts or as a dietary supplement. However, high doses may result in adverse GI effects such as nausea and vomiting in some individuals. Additionally, neem may interact with certain medications, including antidiabetic drugs and immunosuppressants, potentially altering their effects [22] Neem has become a modern medical cynosure and has been widely employed in ayurvedic, unani and homoeopathic medicine. Neem helps cells utilize insulin more effectively, thereby improving glucose uptake and reducing insulin resistance—one of the primary causes of type 2 diabetes. Certain phytochemicals in neem support the regeneration of pancreatic β-cells, which are responsible for insulin secretion. This helps in maintaining better glycaemic control.
4) Jamun: Jamun *(Syzygium cumini)*, also known as Java plum or Indian blackberry, is one such plant with historic evident for its potential health benefits and usage in traditional medicine. A common practice followed traditionally to cure diabetes using *Syzygium cumini* (Myrtaceae) by homemade decoction, extract with water and alcohol, lyophilized powder prevails. Jamun containing potential bioactive compounds ranges from polyphenols, flavonoids, and anthocyanins, which contribute toward pharmacological effects. Jamun is safe for consumption when used in culinary amounts or as a dietary supplement. However, in certain people, large dosages of jamun may result in gastrointestinal side effects like diarrhoea and abdominal pain. Furthermore, jamun may change the action of several medications, such as anticoagulants and antidiabetic medications [23,25,38].
5) Papaya: Papaya *(Carica papaya)*, a tropical fruit known for its sweet flavor and nutritional benefits, has gained attention for its potential antidiabetic properties. Papaya contains various bioactive compounds, including phenolic compounds, flavonoids and enzymes such as papain, which contribute to its pharmacological effects. Papaya, when consumed in moderate amounts as part of a balanced diet, is generally considered safe. However, individuals with latex allergy may experience allergic reactions to papaya. Additionally, high doses of papaya or papaya supplements may cause gastrointestinal side effects such as diarrhoea and abdominal discomfort in some individuals [39,42]. Papaya has a low to moderate glycemic index, meaning it releases glucose into the bloodstream slowly. This prevents sudden spikes in blood sugar levels, which is crucial for reducing the risk of insulin resistance. Papaya is packed with antioxidants like vitamin C, vitamin A (from beta-carotene), and flavonoids. Certain phytochemicals in papaya, such as flavonoids and alkaloids, are known to enhance insulin sensitivity.
6) Mango: Mango *(Mangifera indica)* a popular tropical fruit cherished for its sweet taste and rich nutritional profile, has garnered attention for its potential antidiabetic properties. Mango has a variety of bioactive compounds such as polyphenols, flavonoids and vitamins, who contribute to its pharmacological effects: Mango has been shown to improve glucose metabolism by enhancing insulin sensitivity and glucose uptake in peripheral tissues. Studies suggest that bioactive compounds present in mango, such as mangiferin and quercetin, stimulate the translocation of Glucose Transporter proteins (GLUT4) to the cell membrane, facilitating glucose uptake and utilization [43,45,48]. Mangiferin, a unique compound in mango, has been shown in studies to enhance insulin secretion and reduce insulin resistance—two key factors in preventing type 2 diabetes. Mango contains polyphenols, such as mangiferin, quercetin, and catechins. These compounds have antioxidant and anti-inflammatory properties that improve insulin sensitivity and help regulate glucose metabolism.
7) Aloe vera: Aloe vera *(Aloe barbadensis Miller)*, a succulent plant widely recognized for its medicinal properties, has shown promising potential in the prevention and management of type 2 diabetes mellitus. Rich in bioactive compounds such as polysaccharides, anthraquinones, flavonoids, and lectins, Aloe vera helps regulate blood glucose levels through multiple mechanisms. Studies suggest that Aloe vera enhances insulin sensitivity, promotes pancreatic β-cell function, and reduces intestinal glucose absorption, thereby improving overall glycemic control. In addition, its antioxidant and anti-inflammatory properties protect against oxidative stress, which plays a major role in the progression of diabetes and its complications. Regular supplementation with Aloe vera extracts or juice has been reported to lower fasting blood sugar and HbA1c levels, making it a valuable complementary approach for preventing and managing type 2 diabetes. [49,52,56]
8) Turmeric: Turmeric *(Curcuma longa)*, a golden-yellow spice widely used in traditional medicine and culinary practices, has attracted significant scientific attention for its potential role in preventing and managing type 2 diabetes mellitus (T2DM). This metabolic disorder, characterized by insulin resistance, elevated blood glucose levels, and impaired insulin secretion, has become a global health challenge due to sedentary lifestyles, unhealthy diets, and genetic predisposition. [51] Researchers have

identified curcumin, the principal bioactive compound of turmeric, as a promising natural agent with anti-inflammatory, antioxidant, and glucose-regulating properties that can help reduce the risk of developing type 2 diabetes. One of the major factors contributing to T2DM is chronic low-grade inflammation in the body. Persistent inflammation disrupts normal insulin signaling pathways, thereby impairing the body's ability to regulate blood glucose. Curcumin from Curcuma longa has been shown to inhibit proinflammatory cytokines such as TNF-α and interleukin-6, which are responsible for creating an environment of insulin resistance. By lowering these inflammatory markers, turmeric helps preserve insulin sensitivity, allowing the hormone to function effectively and maintain stable blood sugar levels.

9) Garlic: Garlic *(Allium sativum),* a widely used culinary spice and medicinal herb, has been recognized for centuries for its therapeutic properties. Belonging to the family Amaryllidaceae, garlic is not only valued for its pungent flavor but also for its wide spectrum of bioactive compounds that contribute to health benefits, including the prevention and management of type 2 diabetes mellitus (T2DM). Type 2 diabetes, a metabolic disorder characterized by insulin resistance and impaired glucose metabolism, is becoming increasingly prevalent worldwide due to sedentary lifestyles and unhealthy dietary patterns. Garlic, when incorporated into the diet or used as a supplement, has shown promising antidiabetic effects through various biochemical and physiological mechanisms. One of the most important constituents of garlic is allicin, a sulfur containing compound formed when garlic is crushed or chopped. Allicin and its derivatives, such as diallyl disulfide and S-allyl cysteine, exhibit potent antioxidant and anti-inflammatory activities that help reduce oxidative stress—a key factor in the development of insulin resistance. In type 2 diabetes, chronic oxidative stress damages pancreatic β-cells, which are responsible for insulin secretion. Garlic compounds neutralize free radicals, thereby protecting β-cells from damage and improving their ability to produce insulin effectively [57-60].

10) Bitter Gourd: Bitter gourd contains a diverse array of bioactive compounds, including cucurbitane-type triterpenoids, flavonoids, phenolic acids and lectins, which contribute to its medicinal properties. Among these, charantin, polypeptide-p and vicine are some of the key constituents responsible for bitter gourd's antidiabetic effects. Studies have shown that bitter gourd extracts stimulate insulin secretion both in vitro and in animal models, suggesting its potential as a natural insulin secretagogue. Empirical evidence supporting the antidiabetic activity of bitter gourd is accumulating, although clinical studies necessitate further validating safety and efficacy in human beings. The anti-diabetic effects of *Momordica charantia* can be attributed to its bioactive compounds such as charantin, polypeptide-p (plant insulin), and vicine. These compounds collectively contribute to reducing blood glucose by enhancing glucose uptake and improving insulin secretion. Charantin, a mixture of steroidal saponins, is one of the most studied phytochemicals in bitter gourd. It has been demonstrated to have a blood sugar-lowering effect similar to some oral hypoglycemic drugs. Polypeptide-p, often referred to as "plant insulin," mimics the action of human insulin by stimulating glucose uptake into muscle and fat cells, thus reducing circulating glucose levels. Vicine, another compound, contributes to lowering oxidative stress in pancreatic β-cells, thereby supporting their insulin-secreting function. [53-61].

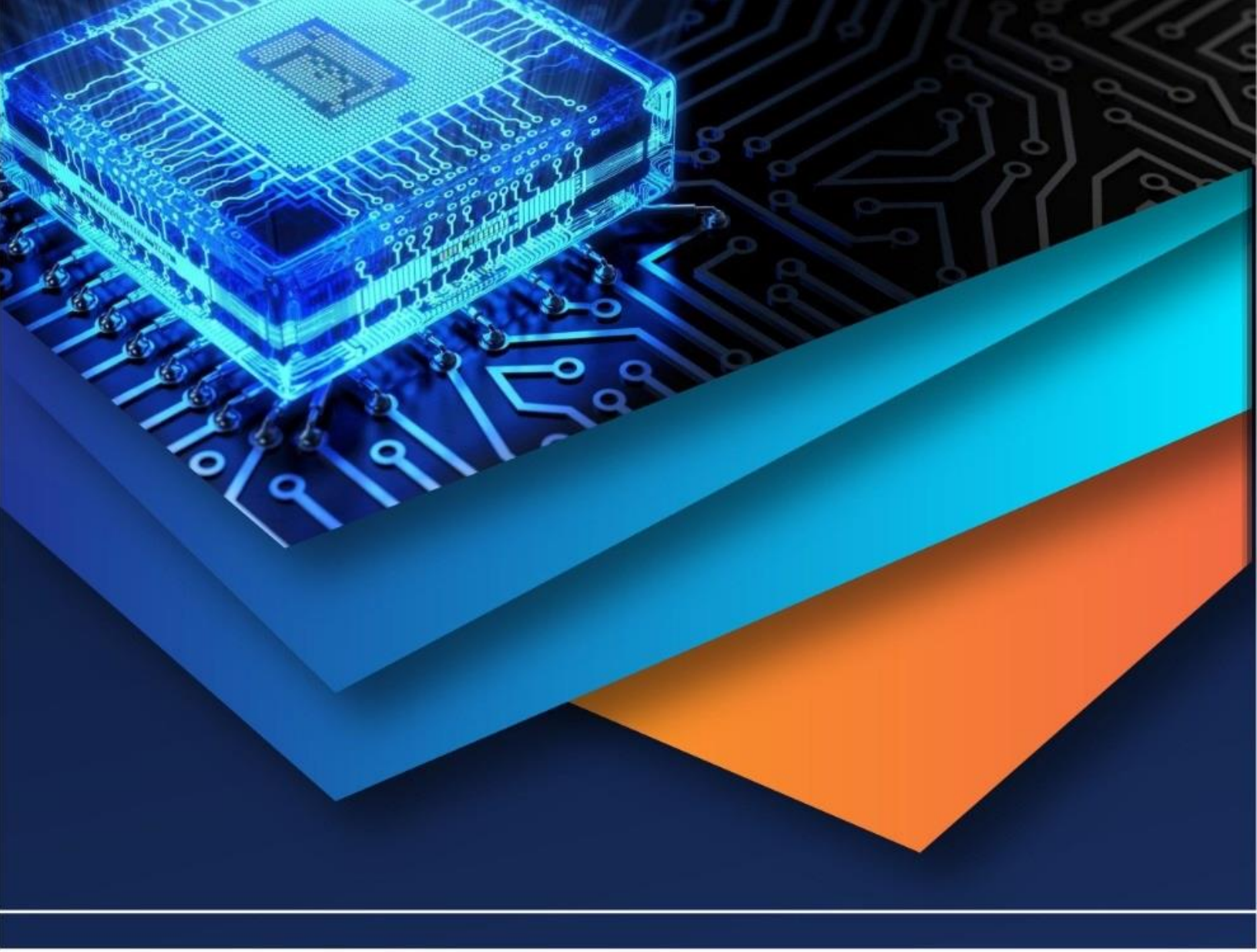
VI. CONCLUSION

The increasing amount of data that supports the use of herbal medicine to treat diabetes highlights how natural therapies can be used in addition to traditional methods. Herbal remedies have demonstrated their efficacy in managing blood sugar levels, improving insulin sensitivity and addressing various complications associated with diabetes. The integration of herbal medicine into diabetes care not only offers a holistic and personalized approach but also opens avenues for exploring sustainable, nature-derived solutions. The rich history of herbal medicine across cultures further emphasizes its time-tested reliability in promoting overall well-being. Harnessing the power of plant-based compounds, herbal remedies not only target the symptoms but also address the root causes of diabetes. This holistic approach aligns with the growing trend towards personalized and patient-centred healthcare. Moreover, the relatively lower risk of side effects associated with many herbal treatments presents a compelling case for their inclusion in diabetes management plans. As we strive for more sustainable and natural healthcare solutions, herbal medicine stands out as a promising avenue for diabetic individuals seeking effective, safe and long-term strategies for their well-being. However, it is crucial to note that individual responses to herbal remedies may vary and consultation with healthcare professionals remains essential. Further research is required to integrate herbal medicine into mainstream diabetes care, collaboration of modern and traditional medicine and on-going exploration of the vast potential that nature offers in the fight against diabetes. In embracing the wisdom of traditional healing practices and combining it with modern scientific knowledge, we pave the way for a comprehensive and integrated approach to diabetes management. The continued exploration and utilization of herbal medicine mark a significant step towards a future where individuals with diabetes can access a diverse array of treatment options that prioritize both their health and the sustainability of our healthcare systems. [1, 4, 19, 30, 20, 24, 36,45,52,60].

REFERENCES

[1] Singh KK, Singh SS, C. Sharma CL. Antidiabetic and antioxidant properties of important traditional medicinal plants from north eastern India. Indian Journal of Pharmaceutical Sciences and Research. 2024; 15(6): 1728-1736.
[2] Mani R, Kunchu K, Pallab KH. Role of herbal plants in the diabetes mellitus therapy: an overview. International Journal of Applied Pharmaceutics, 2014; 6(3): 1-3.
[3] Sahu U, Tiwari SP, Roy A. Comprehensive Notes on Anti diabetic Potential of Medicinal Plants and Polyherbal Formulation. UK Journal of Pharmaceutical and Biosciences. 2015; 3(3):57-64.
[4] Balwan WK, Saba N, Zargar JI. Burden of Diabetes and Role of Medicinal Plants in Its Treatment. Saudi Journal of Medical and Pharmaceutical Sciences. 2022; 8(7): 355361.
[5] Manoharachary C, Nagaraju D. Medicinal plants for human health and welfare. Annuals of Phytomedicine. 2016; 5(1): 24-34.
[6] Arya SS, Sonia NS and Nair DS. Functional potential of anti-diabetic medicinal plants. Journal of Pharmacognosy and Phytochemistry. 2021; 10(2): 1177-1181.
[7] Elavarasi S, Saravanan K, Renuka C. A systematic review on medicinal plants used to treat diabetes mellitus. Indian Journal of Pharmaceutical, Chemical and Biological Sciences. 2013; 3(3): 983-992.
[8] Moneim AA, Fayez H. A review on medication of diabetis mellitus and antidiabetic medicinal plants. International Journal of Bioassays. 2015; 4(06): 4002-4012.
[9] Deepak KGK, Reddy NRN, Challa S. Role of Antidiabetic Compounds on Glucose Metabolism - A Special Focus on Medicinal Plant: Salacia sps. Medicinal chemistry. 2014; 4(3): 373-381.
[10] Oyagbemi AA, Salihu M, Oguntibeju OO, Esterhuyse AJ, Farombi EO. Some Selected Medicinal Plants with Antidiabetic Potentials. Intech Open. 2014; 4: 5772-57230.
[11] Patel DK, Kumar R, Laloo D, Hemalatha S. Diabetes mellitus: An overview on its pharmacological aspects and reported medicinal plants having antidiabetic activity. Asian Pacific Journal of Tropical Biomedicines. 2012; 2(5): 411-420.
[12] Swaroopa P, Reddy VJS, Koshma M, Sudharani Y, Basha SJ, Adithya TN. Review on Antidiabetic Activity on Medicinal Plants. International Journal of Pharmacological Research 2017; 7(12): 230-235.
[13] Pawar AV, Patil SJ, Killedar SG. Uses of Cassia Fistula Linn as a Medicinal Plant. International Journal of Advance Research and Development. 2017; 2(3): 85-91.
[14] Bushnak R, Mohamad HEI, Jaber A. A Review on the Antidiabetic Potential of Medicinal Plants. Sumerianz Journal of Medical and Healthcare, 2021; 4(4): 172-189.
[15] Shakya AK. Medicinal plants: Future source of new drugs. International Journal of Herbal Medicine. 2016; 4(4): 59-64.
[16] Rao MU, Sreenivasulu M, Chengaiah B, Reddy KJ, Chetty CM. Herba lMedicines for Diabetes Mellitus: A Review. International Journal of Pharmeutical and Technical Research. 2010; 2(3): 1883-1892.
[17] Aggarwal N, Shishu. A Review of Recent Investigations on Medicinal Herbs Possessing Anti-Diabetic Properties. Journal of Nutrition Disorder Therapeutics. 2011; 1(1):1-10.
[18] Kumar S, Saini M, Kumar V, Prakash O, Arya R, Rana M, Kumar D. Traditional medicinal plants curing diabetes: A promise for today and tomorrow. Asian Journal of Traditional Medicines. 2012; 7(4):178-188.
[19] Rosalie IO, Ekpe EL. Antidiabetic potentials of common herbal plants and plant products: A glance. International Journal of Herbal Medicine 2016; 4(4): 90-97.
[20] Dwivedi C, Daspaul S. Antidiabetic Herbal Drugs and Polyherbal Formulation Used For Diabetes: A Review. The Journal of Phytopharmacology 2013; 2(3): 44-51.
[21] Mentreddy SR, Mohamed AI, Rimando AM. Medicinal plants with hypoglycemic/Anti-Hyperglycemic Properties: A Review. Bioproduct: 341353.
[22] Goel R, Bhatia D, Gilani SJ, Katiyar D. Medicinal Plants as antidiabetic: A Review. International Bulletin of Drug Research; 1(2): 100107.
[23] Kumar BD, Mitra A, Manjunatha M. In vitro and In Vivo Studies of Antidiabetic Indian Medicinal Plants: A Review. Journal of Herbal Medicine and Toxicology, 2009; 3(2): 9-14.
[24] Sivakumar T, Deepa B. A critical review on Antidiabetic Potential of Herbal plants and its their bioactive components. Journal of University of Shanghai for Science and Technology, 2023; 25(01): 303-314.
[25] Alhassan AJ, Lawal TA, Dangambo MA. Antidiabetic Properties of Thirteen Local Medicinal Plants in Nigeria, A Review. World Journal of Pharmaceutical Research, 2017; 6(8): 2170-2189.
[26] Chauhan A, Sharma PK, Srivastava P, Kumar N, Dudhe R. Plants Having Potential Antidiabetic Activity: A Review. Der Pharmacia Lettre, 2010; 2(3): 369-387.
[27] Singab AN, Youssef FS, Ashour ML. Medicinal Plants with Potential Antidiabetic Activity and their Assessment. Medicinal Aromatic Plants. 2014; 3(1): 1-12.
[28] Kumar AS, Kavimani S, Jayaveera KN. A Review on medicinal Plantswith Potential Antidiabetic Activity. International Journal of Phytopharmacology. 2011; 2(2): 53-60.
[29] Elbakry M, Elremaly W. Antidiabetic activity of some common medicinal plants. Biological and Biomedical Journal. 2023; 1(2):1 16.
[30] Patil R, Patil R, Ahirwar B, Ahirwar D. Current status of Indianmedicinal plants with antidiabetic potential: a review. Asian Pacific Journal of Tropical Biomedicine. 2011:291-298.
[31] Bilala M, Iqbalb MS, Shaha SB, Rasheedc T, Iqba HMN. Diabetic Complications and Insight into Antidiabetic Potentialities of EthnoMedicinal Plants: A Review. Recent Patents on Inflammation & Allergy Drug Discovery. 2018; 12(1): 1-17.
[32] Mustaffa F, Indurkar J, Ali NIM, Hanapi A, Shah M, Ismail S, Mansor SM. A Review of Malaysian Medicinal Plants with Potential Antidiabetic Activity. Journal of Pharmacy Research. 2011; 4(11): 4217-4224.
[33] Shukla R, Sharma SB, Puri D, Prabhu KM, Murthy PS. Medicinal plantsfor treatment Of Diabetes Mellitus. Indian Journal of Clinical Biochemistry. 2000; 15: 169-177.
[34] Grover JK, Yadav S, Vats V. Medicinal plants of India with antidiabetic potential. Journal of Ethnopharmacology. 2002; 81: 81-100.

[35] Patel DK, Prasad SK, Kumar R, Hemalatha S. An overview on antidiabetic medicinal plants having insulin mimetic property. Asian Pacific Journal of Tropical Biomedicine. 2012; 2(4): 320-330.
[36] Jung M, Park M, Lee HC, Kang YH, Kang ES, Kim SK. Antidiabetic Agents from Medicinal Plants. Current Medicinal Chemistry. 2006; 13: 1203-1218.
[37] Banerjee J, Chanda R, Samadder A. Antidiabetic activity of *Momordica charantia* or bitter melon: a review. Acta Scientific Pharmaceutical Sciences. 2019; 3: 24-30.
[38] Panara JR. A short review on the antidiabetic activity of bitter gourd. International Journal of Pharmaceutical Research Bio-Sci. 2013; 2(4): 333-6.
[39] Ahmad Z, Zamhuri KF, Yaacob A, Siong CH, Selvarajah M, Ismail A, etal. In vitro anti-diabetic activities and chemical analysis of polypeptide-k and oil isolated from seeds of *Momordica charantia* (bitter gourd). Molecules. 2012; 17(8): 9631-40.
[40] Leung L, Birtwhistle R, Kotecha J, Hannah S, Cuthbertson S. Antidiabetic and hypoglycaemic effects of *Momordica charantia* (bitter melon): a mini review. British Journal of Nutraceuticals. 2009; 102(12): 1703-8.
[41] Amer SA, Al-Khalaifah HS, Gouda A, Osman A, Goda NI, Mohammed HA. Potential effects of anthocyanin-rich Roselle (*Hibiscus sabdariffa* L.) extract on the growth, intestinal histomorphology, blood biochemical parameters and the immune status of broiler chickens. Antioxidants (Basel). 2022; 11(3): 544.
[42] Kumar TR, Kumar EU, Sekar M, Kumar MS. Antidiabetic activity of methanolic extract of *Hibiscus cannabinus* in streptozotocin-induced diabetic rats. International Journal of Pharmaceutical and Biological Sciences. 2011; 2(1).
[43] Bhaskar A, Vidhya VG. Hypoglycemic and hypolipidemic activity of *Hibiscus rosa-sinensis* Linn. on streptozotocin-induced diabetic rats. International Journal of Diabetes in Devoloping Countries. 2012; 32(4): 214-8.
[44] Bule M, Albelbeisi AH, Nikfar S, Amini M, Abdollahi M. The antidiabeticand antilipidemic effects of *Hibiscus sabdariffa*: A systematic review and meta-analysis of randomized clinical trials. Food Research International. 2020; 130: 108980.
[45] Sankaran M, Vadivel A. Antioxidant and antidiabetic effect of *Hibiscus rosa-sinensis* flower extract on streptozotocin-induced experimental rats: a dose-response study. Notulae Scientia Biologicae. 2011; 3(4): 13-21.
[46] Sachdewa A, Nigam R, Khemani LD. Hypoglycemic effect of *Hibiscusrosa-sinensis* L. leaf extract in glucose and streptozotocin-induced hyperglycemic rats. Indian Journal of Experimental Biology. 2001 Mar; 39(3): 284-6.
[47] Pakan P, Lidia K, Riwu M. Investigation of ginger *(Zingiber officinale)* aqueous extract as an anti-diabetic in vitro. IOP Conf Ser Earth Environ Sci. 4th International Conference on Bioscience and Biotechnology. 2021; 913(1).
[48] Noipha K, Ninla-Aesong P. Antidiabetic activity of *Zingiber officinale* Roscoe rhizome extract: an in vitro study. HAYATI Journal of Biosciences. 2018; 25(4):160-4.
[49] Akhani SP, Vishwakarma SL, Goyal RK. Anti-diabetic activity of *Zingiber officinale* in streptozotocin-induced type I diabetic rats. Journal of Pharmacy and Pharmacol. 2004; 56(1): 101-5.
[50] Otunola G, Afolayan A. A review of the antidiabetic activities of ginger. Intech Open; 2020.
[51] Shidfar F, Rajab A, Rahideh T, Khandouzi N, Hosseini S, Shidfar S. The effect of ginger *(Zingiber officinale)* on glycemic markers in patients with type 2 diabetes. Journal of Complement Integrated Medicines. 2015; 12(2): 165-70.
[52] Khosla P, Gupta DD, Nagpal RK. Effect of *Trigonella foenum-graecum* (Fenugreek) on blood glucose in normal and diabetic rats. Indian Journal of Physiological Pharmacology. 1995; 39(2): 173-4.
[53] Gondi M, Prasada Rao UJ. Ethanol extract of mango (*Mangifera indica* L.) peel inhibits α-amylase and α-glucosidase activities and ameliorates diabetes related biochemical parameters in streptozotocin (STZ)-induced diabetic rats. Journal of Food Science and Technology. 2015; 52(12): 7883-93.
[54] Juárez-Roop IE, Díaz-Zagora JC, Ble-Castillo JL, Miranda-Osorio PH, Castell-Rodríguez AE, To villa-Zárate CA, et al. Hypoglycaemic effect of *Carica papaya* leaves in streptozotocin-induced diabetic rats. BMC Complementary and Alternnative Medicines. 2012; 12: 236
[55] Phil RA, Khan RA, Ashraf I. Effects of garlic on blood glucose levels and HbA1c in patients with type 2 diabetes mellitus. Journal of Medicinal Plants Research. 2011; 5(13): 2922-8.
[56] Latha RCR & Daisy P, Influence of *Terminalia Billerica* Roxb. fruit extracts on Biochemical parameters in STZ Diabetic rats. International Journal of Pharmacology. 2010: 89.
[57] Madar Z, Rachel A, Shelomith S & Joseph A Glucose lowering effect of fenugreek in noninsulin dependent diabetics, European Journal of Clinical Nutrition. 1988; 42: 51
[58] Solikhah TI, Setiawan B, Ismukada DR. Antidiabetic activity of papaya leaf extract (*Carica papaya* L.) isolated with maceration method in alloxan-induced diabetic mice. Cyst Rev Pharm. 2020; 11(9): 774-8.
[59] Dholi SK, Rapala R, Mancala S, Nagappan K. In vivo antidiabetic evaluation of neem leaf extract in alloxan-induced rats. Journal of Applied Pharmaceutical Science. 2011; 1(4): 100-5.
[60] Patil P, Patil S, Mane A, Verma S. Antidiabetic activity of alcoholic extract of neem (*Azadirachta indica*) root bark. The National Journal of Physiology, Pharmacy and Pharmocology. 2013; 3(2): 142-6.
[61] Gajera HP, Gevariya SN, Hirpara DG, Patel SV, Golakiya BA. Antidiabetic and antioxidant functionality associated with phenolic constituents from fruit parts of indigenous black jamun (*Syzygium cumini* L.) landraces. Journal of Food Science and Technology. 2017; 54(10): 3180-91.



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