



A Comprehensive Study On The Medicinal Chemistry Of Traditional Herbs In Diabetes Mellitus Management

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ABSTRACT:

This research offers a comprehensive analysis of the medicinal chemistry of traditional herbs used to treat diabetes mellitus (Dm). The purpose of the study is to clarify the effectiveness of these herbs in the management of diabetes mellitus by examining their phytochemical composition, mechanisms of action, and therapeutic potential. It investigates the bioactive compounds found in traditional herbs, their mechanisms of action, including improvements in insulin sensitivity and secretion, and any possible synergistic effects from combining them. The study also discusses contemporary methods for enhancing the therapeutic efficacy of herbal extracts and highlights the significance of quality control and standardization procedures. Finding the Different Types of Traditional Drugs, Their Ingredients, and Research Articles Is the Study's Main Objective. Data were gathered, tallied, and examined. Using this information, the medicinal plants used in traditional medicine to treat diabetes mellitus (Dm) were identified.

Keywords: Medicinal plants, traditional medicine, and diabetic mellitus. Herbs, Traditional Medicine, Medicinal Chemistry, Management.

INTRODUCTION:

Diabetes mellitus (DM) is a worldwide health concern that is defined by high blood glucose levels brought on by abnormalities in the production, action, or both of insulin. Its incidence is rising quickly, especially in low- and middle-income nations, therefore managing it effectively is essential to reducing the problems it causes and the strain it places on healthcare systems. Traditional herbal

medicines have received a lot of attention for their possible therapeutic effects in the management of diabetes mellitus, even if current pharmacotherapies continue to be crucial.

The amalgamation of conventional herbal therapy with contemporary scientific research signifies the coming together of age-old knowledge and understanding. Many civilizations have used a variety of

medicinal herbs for ages to treat diabetes symptoms. These plants are frequently abundant in bioactive substances with potential anti-diabetic effects, such as flavonoids, alkaloids, polyphenols, and terpenoids.

Scientific investigation is necessary to determine the safety and effectiveness of traditional herbal treatments in the management of

diabetes mellitus. The goal of this extensive study is to decipher the complex medicinal chemistry of traditional plants used in the treatment of diabetes mellitus. This study attempts to clarify the modes of action, bioactive components, and therapeutic potentials of these plants by combining current literature and practical data.



Aegle marmelos



Azadirachta indica



Coriandrum sativum



Momordica charantia



Allium cepa



Brassica juncea



Eugenia jambolana



Ocimum sanctum



Allium sativum



Carica papaya



Gymnema sylvestre



Tinospora cardifolia



Aloe borbadensis



Catharanthus roseus



Mangifera indica

Figure1: Herbal Herbs for Diabetes

This study also explores the synergistic effects of natural mixtures that are typically used in traditional medicine systems, looking at their potential to improve therapeutic outcomes and lessen adverse effects. Additionally, it evaluates current extraction practices, including methods and quality control techniques aimed at enhancing the suitability, safety, and normalization of natural products for diabetic medicine treatment.

This study attempts to provide tidbits of information that may shed light on evidence-based approaches to deal with diabetes mellitus (DM) management by bridging the gaps between the realms of conventional information and modern logical demands. It encourages the integration of traditional homegrown medicine into comprehensive medical care ideal models while acknowledging its rich history. In the end, this study emphasizes the urgent need for further research, approval, and integration of traditional natural remedies into conventional DM management approaches, providing a thorough and sensitive approach to address this burgeoning global health crisis.

LITERATURE REVIEW:

Tran et.al (2020) and published in *Biology* delves into this field. They investigate how bioactive substances made their way from conventional

herbal therapy to contemporary medication research. Through the process of amalgamating data from several sources, such as conventional wisdom and scientific investigations, the writers offer valuable perspectives on the modes of operation and remedial possibilities of these substances. Their analysis emphasizes how crucial it is to use the wide range of bioactive substances present in anti-diabetic plants in order to create innovative medicinal treatments.

Choudhury et.al (2018) add to the body of literature. An updated summary of natural substances used to treat diabetes mellitus is given in this article. The authors provide thorough insights into the safety and effectiveness characteristics of several natural substances by looking at a wide variety of research. Their assessment opens the door for more study and advancement in this area by highlighting the significance of evidence-based methods when using natural substances for the management of diabetes.

Kumar et.al (2021) research focuses on herbal remedies in particular for the treatment of diabetes and its side effects. Their assessment, which was published in *Current Diabetes Reviews*, offers a thorough examination of the therapeutic potential of herbal remedies in reducing the signs and symptoms of diabetes mellitus. The authors clarified the processes by which herbal remedies

work against diabetes by combining data from clinical trials and laboratory research. The significance of herbal remedies as supplemental or alternative treatments for diabetics is emphasized in their assessment.

Kasole and Kimiywe (2019). Their research on the use of traditional medicine for diabetes care examines the viewpoints of patients and herbalists, and it was published in Evidence-Based Complementary and Alternative Medicine. The authors offer important insights into the cultural and societal aspects affecting the use of traditional medicine in the treatment of diabetes by combining qualitative research approaches. Their research emphasizes how crucial it is to take patients' and herbalists' viewpoints into account when creating comprehensive and culturally appropriate therapeutic solutions.

Akbar's (2020) publication. Researchers, medical professionals, and anybody interested in learning more about the therapeutic potential of medicinal plants can all benefit from this guide. Akbar provides a comprehensive review of historic medical methods and their applicability in contemporary healthcare by combining data from several sources.

RESEARCH METHODOLOGY:

1. Study Design:

Data were collected from the authenticated Siddha text, Sarapenthira

Vaithiya Murai (Neerilivu chikitsai) , and a relevant research publication.

2. Place and Duration of Study:

September 2022–September 2023: Government Ayurvedic Clinical School and Emergency Clinic, Delhi.

3. Data Collection:

Information was gained utilizing paper and SVM-NC. Utilizing this data, it was feasible to recognize the medicinal plants that are utilized in traditional medicine to treat diabetes mellitus. This is the explanation that 85 medications were prohibited from the review. Among 85 medications, 80 medicinal plants from 65 families addressed in the SVM-NC were overviewed. The review zeroed in on the accompanying attributes of the remarkable medicinal plant species: families, explicit parts utilized, Siddha properties (taste, strength, and feasibility), requested positions (sensible, English, and Tamil), pharmacological exercises, and endorsement of the pharmacological movement with huge assessment article. These were noted for the 85 medicinal plants that were chosen. Information was gotten from the site and the SVM-NC.

4. Statistical Analysis:

The data were managed and quantitatively examined using Microsoft Succeed 2023 and a simple factual methodology.

RESULTS AND DISCUSSION:

1. Method of Drug Administration:

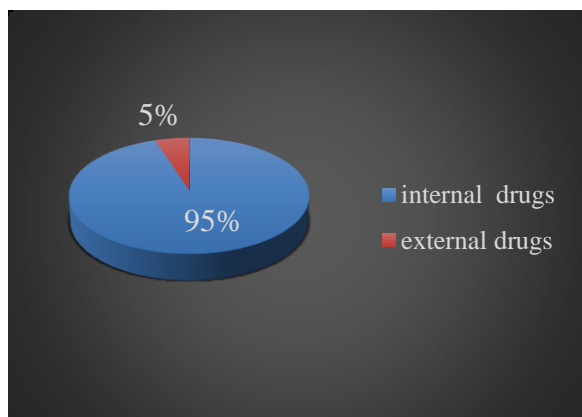


Figure 2: Mode of Administration of Drugs

Throughout the examination, 85 different drugs were identified. Of the 85 drugs, 83 (95%) are used internally, while 2 (5%) are used externally.

2. Forms of Medicine:

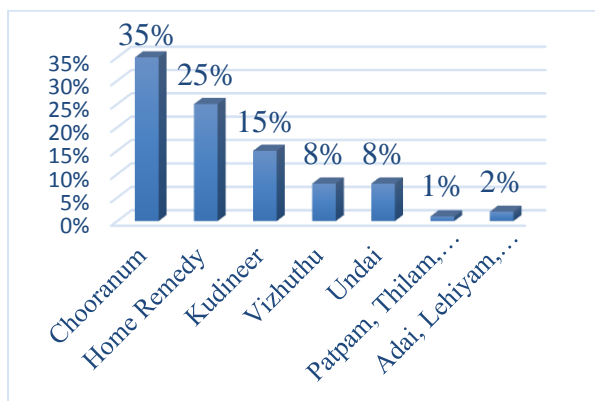


Figure 3: Forms Of Medicine

The 85 within medicines are divided into 26 (35%) Chooranum, 22 (25%) Home Cure, 12 (15%) Kudineer, 10 (8%) Vizhuthu, 6 (8%) Undai, 1 (1%) Patpam, Thilam, Kuzhambu, and 1 (2%) Adai, Lehiyam, Kirutham, and Kaarai neer.

3. Distribution of Medicinal Plant Families:

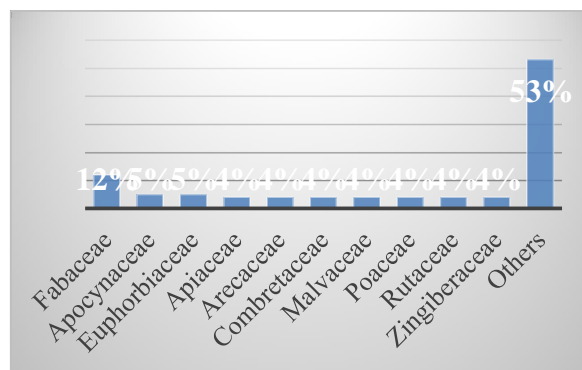


Figure 4: Family Distribution of Medicinal Plants

Eighty-five medicinal plants are recognized among the 85 drugs. 85 medicinal plants were divided into 63 families. 12% (25) of the plants are in the Fabaceae family, 5% (4) are in the Apocynaceae and Euphorbiaceae family, and 4% (3) are in the Apiaceae, Arecaceae, Combretaceae, Malvaceae, Poaceae, Rutaceae, and Zingiberaceae family.

THE MEDICINAL PLANTS TAXONOMIC:

Within the kingdom of plants, medicinal plants represent a wide range of taxa and are essential parts of both traditional and contemporary pharmacopeias. Comprehending their taxonomic status illuminates their evolutionary connections and facilitates the classification and examination of their biological attributes. Here, we examine the taxonomic classifications of a number of widely used medicinal plants:

Aloe vera, or *Aloe barbadensis* as it is known in science, is classified as a plant organism since it is a member of the kingdom Plantae. It belongs to the class Monocots of angiosperms, or flowering plants, which includes plants whose seeds have a single cotyledon. Aloe vera is also a member of the Asparagales order and the Asphodelaceae family (formerly part of the Liliaceae family). It belongs to the genus *Aloe* and has botanical characteristics with other *Aloe* species; nevertheless, it is distinguished from other members of the genus by its specific epithet, *barbadensis*.

Ginkgo biloba, sometimes referred to as the maidenhair tree or ginkgo, is another taxonomic classification for a medicinal plant. *Ginkgo biloba* is categorized as a eudicot among the angiosperms since its seeds have two cotyledons. It is a member of the family Ginkgoaceae, which only includes the genus *Ginkgo*, and the order Ginkgoales. With no near surviving relatives, *Ginkgo biloba* is a unique representative of its taxonomic category and one of the oldest species of trees still in existence.

The well-known medical herb *Panax ginseng* is a member of the phylum Angiosperms and the kingdom Plantae, which classifies it as a flowering plant. It belongs to the family Araliaceae and order Apiales among the eudicots. Its taxonomic characteristics are shared by other ginseng species as it belongs to

the *Panax* genus. It is distinguished from other species in the genus by the specific name *ginseng*. *Panax ginseng* has been well researched for its possible health benefits and is prized for its adaptogenic qualities.

Curcuma longa, the scientific name for turmeric, is widely used in traditional medical systems around the globe. It is classified as a blooming plant since it is a member of the phylum Angiosperms and the kingdom Plantae. As a monocot, turmeric belongs to the Zingiberales order, which also contains plants like bananas and ginger. Turmeric belongs to the genus *Curcuma*, which is within the Zingiberaceae family. Its specific epithet is *longa*.

Comprehending the taxonomic classifications of therapeutic plants facilitates botanical categorization and study while offering valuable insights into their evolutionary links. Despite having different taxonomic connections, these plants have one thing in common: they are excellent producers of bioactive chemicals with potential use in medicine. It is possible to clarify their medicinal qualities and realize their full therapeutic potential by further investigating their taxonomic and biological traits..

SPECIFIC PART USED OF MEDICINAL PLANTS FOR THE MANAGEMENT OF THE DIABETES MELLITUS:

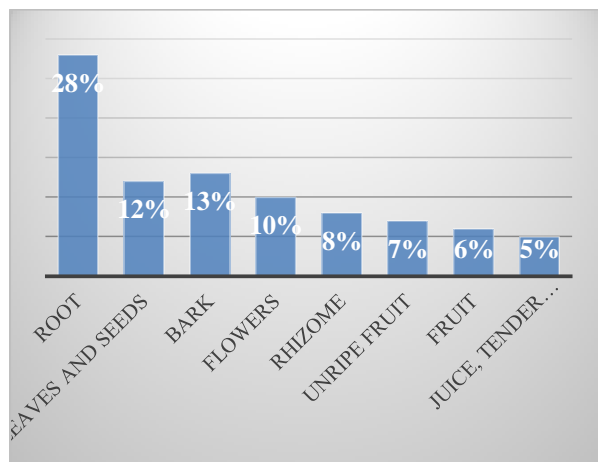


Figure 5: A portion of medicinal plants are used to treat diabetes mellitus.

Twenty (10%) of the 85 medicinal plants are used as blooms, 10 (8%), as rhizomes, 10 (7%), as unripe organic products, and 5 (28%) as roots, 10 (12%), as leaves and seeds, and 15 (13%) as bark. Eight (six percent) of the plants are used as natural products, while seven (5 percent) are used as juice, tender leaves, and tar.

MEDICINAL PLANTS BIOLOGICAL ACTIVITY:

Traditional herbs, which are typically therapeutic plants, have a complex biological activity that incorporates several pathways in the treatment of diabetic mellitus (DM). This is a synopsis of their biological activity:

1. Hypoglycemic Activity: A variety of therapeutic herbs have hypoglycemic properties that reduce blood sugar levels. They

accomplish this by boosting insulin sensitivity, inducing insulin production, and preventing the intestines from absorbing glucose. Cinnamomum verum, fenugreek (Trigonella foenum-graecum), and bitter melon (Momordica charantia) are a few examples.

2. Antioxidant Activity: The pathophysiology of diabetes and its sequelae is significantly influenced by oxidative stress. Antioxidant-rich medicinal herbs, such as flavonoids, polyphenols, and vitamins, aid in scavenging free radicals, lowering oxidative stress, and shielding pancreatic β -cells from harm. Turmeric (Curcuma longa), Indian gooseberry (Phyllanthus emblica), and green tea (Camellia sinensis) are a few examples.
3. Anti-Inflammatory Activity: The development of diabetes and insulin resistance are strongly associated with long-term low-grade inflammation. Anti-inflammatory medicinal herbs serve to reduce inflammation, which enhances insulin sensitivity and lowers the chance of problems. Some examples include turmeric (Curcuma longa), garlic (Allium sativum), and ginger (Zingiber officinale).

4. Protection of Pancreatic β -cell activity: Maintaining pancreatic β -cell activity is essential for the generation of insulin. It has been shown that several medicinal herbs can prevent pancreatic β -cells from dying and malfunctioning, hence preserving insulin production. As an illustration, consider ginseng (*Panax ginseng*), bitter melon (*Momordica charantia*), and aloe vera (*Aloe barbadensis*).
5. Glycemic Control: Medicinal herbs regulate the activity of α -amylase and α -glucosidase, two enzymes involved in the metabolism of carbohydrates, which lowers postprandial hyperglycemia. Some examples include gymnema (*Gymnema sylvestre*), bitter melon (*Momordica charantia*), and fenugreek (*Trigonella foenum-graecum*).
6. Lipid-lowering Activity: Dyslipidemia and diabetes frequently coincide, which increases the risk of cardiovascular problems. Certain therapeutic plants have the ability to decrease cholesterol, which helps to control cholesterol metabolism and lowers the risk of cardiovascular illnesses. Guggul (*Commiphora wightii*), fenugreek (*Trigonella foenum-graecum*), and garlic

(*Allium sativum*) are a few examples.

7. Renoprotective and Hepatoprotective Effects: Prolonged hyperglycemia and oxidative stress brought on by diabetes can cause damage to the kidneys and liver. Some medicinal plants have hepatoprotective and renoprotective properties that help to maintain the health of these organs. As an illustration, consider ginseng (*Panax ginseng*), milk thistle (*Silybum marianum*), and turmeric (*Curcuma longa*).

CONCLUSION:

An extensive analysis of the medicinal chemistry of traditional plants used to treat diabetes mellitus reveals a wide range of plant-based treatments used in different cultures. There are many choices available in traditional herbal therapy for treating diabetes, according to an analysis of 85 medicinal plants belonging to 63 families. These remedies—which are made from flowers, bark, roots, and leaves—showcase the holistic approach of traditional medical systems by treating diabetes's underlying physiological imbalances as well as its symptoms. Furthermore, it is critical to comprehend the medicinal chemistry of these plants since their chemical components greatly influence how

effective they are as a treatment. Researchers can better understand the processes behind the anti-diabetic benefits of traditional herbs by identifying and evaluating these chemicals. This can help develop evidence-based therapies and improve the safety and effectiveness of traditional formulations. In summary, this thorough investigation establishes a strong basis for future research while highlighting the importance of traditional herbal therapy in the treatment of diabetes mellitus. Novel treatment techniques can be investigated through the integration of traditional knowledge with contemporary scientific methodologies, which might lead to improved healthcare results for patients diagnosed with diabetes mellitus. Among the 85 medicinal plants that were explored, the absolute most generally involved constituents in clinical details incorporate *Cassia auriculata*, *Phyllanthus emblica*, *Strychnos potatorum*, *Terminalia chebula*, *Terminalia bellirica*, *Syzygium aromaticum*, and *Salacia reticulata*. Their anti-diabetic, hepatoprotective, and antioxidant qualities have been emphasized by earlier studies, highlighting their importance in conventional medicine's management of diabetes mellitus. The effectiveness of traditional herbal therapy in treating diabetes mellitus is further supported by this review, which compiles

important scientific results and verified data.

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