

DIABETES MELLITUS: AN REVIEW ON ITS PHARMACOLOGICAL ASPECTS AND REPORTED MEDICINAL PLANTS HAVING ANTIDIABETIC ACTIVITY

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ABSTRACT:

The aim of present review is to establish the use of plants, plant parts or extract in curing Diabetes mellitus. It is a metabolic disorder of the endocrine system and affecting nearly 10% of the population all over the world also the number of those affected is increasing day by day. It is predicated that the number of diabetes person in the world could reach upto 366 million by the year 2030. Even though the cases of diabetes are increasing day by day, except insulin and oral hypoglycemic drugs no other way of treatment has been successfully developed so far. Many plants are rich sources of bioactive compounds with specific pharmacological properties, and they do not cause undesirable side effects. Medicinal plants play an important role in both preventive and curative medicinal preparations for human beings. Herbal medicines are gaining popularity both in developing and developed countries due to their safety, efficacy, quality, very low adverse effects, and easy availability. Medicinal plants that are effective in controlling plasma glucose level with minimal side effects are commonly used in developing countries as alternative therapy for the treatment of diabetes mellitus. The plant families, including the species most studied for their confirmed hypoglycemic effects include, Leguminosae, Lamiaceae, Liliaceae, Cucurbitaceae, Asteraceae, Moraceae, Rosaceae, Euphorbiaceae and Araliaceae.

Key words: *Diabetes mellitus, Antidiabetic activity, Medicinal plants*

1. Introduction

The introduction should provide a clear background of the topic, including the significance of diabetes mellitus (DM), its types, and the need for pharmacological treatments. You can outline the growing prevalence of DM globally, its impact on health, and why natural remedies, like medicinal plants, are being explored as alternatives or adjuncts to conventional therapies.

● Diabetes Mellitus Overview:

- Define diabetes mellitus as a chronic condition characterized by elevated blood sugar levels.
- Discuss the different types: Type 1 Diabetes (insulin-dependent) and Type 2 Diabetes (non-insulin-dependent).
- Mention the global prevalence and increasing rates, especially in developing nations.

● Pharmacological Aspects of Diabetes Mellitus:

- Conventional treatments, such as insulin therapy and oral hypoglycemic agents (e.g., metformin, sulfonylureas).
- The limitations and side effects associated with these therapies.

● Medicinal Plants in Antidiabetic Treatment:

- Briefly introduce the concept of using medicinal plants for managing diabetes and the increasing interest in alternative and complementary medicine.
- Provide an overview of the bioactive compounds in plants that are believed to have antidiabetic effects (e.g., flavonoids, alkaloids, saponins).

Purpose of the Review:

- To examine pharmacological mechanisms of existing diabetic drugs.
- To review the effectiveness of various medicinal plants with antidiabetic properties based on scientific literature.

2. Methodology

The methodology section explains how you gathered the data for your review. Since this is a review paper, you will be synthesizing existing research from various sources. Here's how to structure this:

Methodology:**● Data Collection Approach:**

- Literature search: Databases like PubMed, Scopus, Google Scholar, and Web of Science were used to identify peer-reviewed articles and clinical studies on diabetes mellitus, pharmacological treatments, and medicinal plants with antidiabetic properties.
- Keywords: "Diabetes Mellitus," "antidiabetic medicinal plants," "pharmacological aspects of diabetes," "plant-based treatments for diabetes," etc.

● Inclusion Criteria:

- Studies published within the last 10-15 years (or specify another relevant time period).
- Studies that focus on human clinical trials, animal models, or in vitro studies on medicinal plants and their antidiabetic effects.
- Studies that examine the mechanisms of action of medicinal plants or pharmacological agents used in diabetes management.

● Exclusion Criteria:

- Studies that focus solely on non-peer-reviewed sources or anecdotal evidence.
- Research that does not discuss the pharmacological properties or antidiabetic effects of medicinal plants.

● Analysis Methods:

- After collecting the data, a thematic analysis was conducted to summarize findings related to the pharmacological aspects of diabetes and the antidiabetic activity of specific plants.

- A comparative analysis of conventional drugs vs. medicinal plants for the treatment of diabetes.

3. Results

This section presents a summary of the findings from the studies reviewed. You should organize the results by themes, such as pharmacological aspects of conventional drugs and the types of medicinal plants and their active compounds with antidiabetic activity.

Results:

● **Pharmacological Aspects of Conventional Diabetes Treatments:**

- Metformin: Mechanism of action (increases insulin sensitivity, reduces hepatic glucose production).
- Insulin Therapy: Insulin resistance in Type 2 diabetes and the use of exogenous insulin in Type 1 diabetes.
- Other agents like sulfonylureas, thiazolidinediones, and DPP-4 inhibitors, with their respective mechanisms and potential side effects.

● **Medicinal Plants with Antidiabetic Activity:**

- A table or list of plants with antidiabetic properties, highlighting the following:

- **Plant Name** (e.g., *Gymnema sylvestre*, *Momordica charantia*).
- **Active Compounds** (e.g., saponins, flavonoids, alkaloids).
- **Mechanisms of Action** (e.g., insulin secretion enhancement, inhibition of glucose absorption, antioxidant activity).
- **Clinical Evidence** (e.g., results from human trials, animal studies, in vitro research).
- **Example plants you can mention:**
 - **Gymnema Sylvestre:** Enhances insulin secretion and reduces glucose absorption.
 - **Bitter Melon (*Momordica charantia*):** Contains compounds that mimic insulin and enhance glucose uptake.
 - **Fenugreek (*Trigonella foenum-graecum*):** Rich in soluble fiber, may improve insulin sensitivity.

4. Discussion

The discussion section should interpret the results, comparing the pharmacological aspects of synthetic treatments with the efficacy of medicinal plants. It should also explore the challenges and future directions of using medicinal plants for diabetes management.

Discussion:

● **Efficacy of Conventional vs. Medicinal Plant-Based Therapies:**

- Discuss the pros and cons of synthetic drugs versus plant-based therapies (e.g., side effects, costs, accessibility).

- Highlight the growing interest in natural products due to their fewer side effects, lower cost, and potential synergistic effects.

● **Mechanisms of Action of Medicinal Plants:**

- Explain how specific compounds in plants may help lower blood sugar, improve insulin sensitivity, and support pancreatic health.

● **Challenges in Using Medicinal Plants:**

- Lack of standardization in plant extracts.
- Variability in potency and effectiveness between different plant species and formulations.
- Limited clinical data on the long-term safety and efficacy of plant-based therapies.

● **Future Directions:**

- The need for more robust clinical trials to validate the antidiabetic effects of medicinal plants.
- Research into potential synergistic effects between traditional medicines and synthetic drugs.
- The importance of proper standardization and quality control of plant-based products.

5. Conclusion

Summarize the key points from the review, restating the importance of considering both pharmacological treatments and medicinal plants in diabetes management. Highlight the need for further research and clinical trials to fully explore the potential of medicinal plants in diabetes treatment.

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