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Review Paper

Formulation And Evaluation of Polyherbal Antidiabetic Tablet

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ABSTRACT

Diabetes is a chronic metabolic disorder that affects many people globally[1]. High blood glucose levels brought on by insulin resistance or insufficient insulin are its primary symptoms[1]. Because they are natural and have fewer side effects, herbal treatments are growing in popularity[3]. Three medicinal plants—Momordica charantia, Curcuma longa, and Gymnema sylvestre—are the subject of this review[4,5]. Through several mechanisms, including insulin- like action, increased insulin sensitivity, and decreased glucose absorption, each plant exhibits antidiabetic effect[4–6]. Combining these plants could offer an improved and more successful method of managing,diabetes[5].

INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder characterized by high blood glucose levels due to defects in insulin secretion, action, or both[1]. It is one of the most prevalent diseases worldwide, and its incidence is increasing rapidly, especially in developing countries like India[2]. Conventional antidiabetic drugs are effective but may cause side effects and are sometimes costly[2]. Herbal medicines are gaining popularity due to their safety, affordability, and multi- target action[3].A polyherbal formulation is prepared using Momordica charantia, Curcuma longa, and Gymnema sylvestre[4–6]. Scientific studies support the traditional use of these plants in diabetes management[4–6]. These plants act through multiple mechanisms such as insulin-like activity, increased insulin sensitivity, and reduced glucose absorption[3,5]

2 Classification of Diabetes Mellitus

2.1 Type 1 Diabetes Mellitus

The loss of pancreatic β-cells, which results in minimal or no insulin production, is the etiology of type 1 diabetes. It need insulin therapy and is

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frequently observed in children and young people.[1]

2.2 Type 2 Diabetes Mellitus

The most prevalent type of diabetes is type 2. It is mostly linked to insulin resistance, a condition in which the body's cells do not react appropriately to insulin. It is frequently associated with genetics, sedentary lifestyles, and obesity.[1,2]

2.3 Gestational Diabetes Mellitus

Hormonal changes during pregnancy cause gestational diabetes. It raises the chance of getting Type 2 diabetes later in life, even though it is typically transient.[1]

3. Etiology (Causes)

The following are the primary causes of diabetes: Genetic susceptibility Overweight and obesity Absence of exercise An unhealthy diet Hormonal imbalance and stress[1,2]

4. Pathophysiology

Under normal circumstances, insulin facilitates the uptake of glucose into bodily cells and keeps blood sugar levels within normal ranges. In diabetes, the body either grows resistant to insulin or secretes less insulin, which keeps glucose in the blood and causes hyper glycemia. Chronic hyper glycemia can harm the heart, kidneys, eyes, and nerves, among other organs.[1]

5. Signs and Symptoms

Typical signs of diabetes include Polyuria, or frequent urination Excessive thirst, or polydipsia Polyphagia, or heightened appetite Weariness Loss of weight Vision blurriness[1]

6. Complications

6.1 Acute Complications

- Hypo glycemia
- Hyper glycemia

6.2 Chronic Complications

- Cardiovascular diseases
- Diabetic nephropathy (kidney damage)
- Diabetic neuropathy (nerve damage)
- Diabetic retinopathy (eye damage)

7. Diagnosis

- Diabetes can be diagnosed by the following tests:
- Fasting Blood Glucose Test
- Oral Glucose Tolerance Test (OGTT)
- HbA1c Test[1]

8. Management of Diabetes Mellitus

- Management includes

8.1 Lifestyle Modifications

- Balanced diet
- Regular physical exercise
- Weight management

8.2 Pharmacological Treatment

- Insulin therapy
- Oral hypoglycemic agents[2]

8.3 Herbal Treatment

Medicinal plants like Momordica charantia, Curcuma longa, and Gymnema sylvestre are widely used due to their antidiabetic properties and fewer side effects.[3,6]

9. Drug profile

9.1 Momordica charantia (Karela)

Biological Source: Dried fruits of Momordica charantia

Family: Cucurbitaceae

Common Names: Bitter gourd (English), Karela (Hindi)
Geographical Source: Widely cultivated in India and other tropical regions
Part Used: Fruits
Active Constituents: Charantin, Polypeptide-Momordicin
Pharmacological Activities: Antidiabetic, Hypoglycemic , Antioxidant
Mechanism of Action: Acts like insulin, Increases glucose uptake Lowers blood sugar[6,7]



Fig-1

2. Curcuma longa (Turmeric)

Biological Source: Dried rhizomes of Curcuma longa
Family: Zingiberaceae
Common Names: Turmeric (English), Haldi (Hindi)
Geographical Source: India and Southeast Asia
Part Used: Rhizome
Active Constituents: Curcumin, Turmerone
Pharmacological Activities: Anti-inflammatory, Antioxidant, Antidiabetic
Mechanism of Action: Reduces insulin resistance , Improves insulin sensitivity, Protects pancreatic cells[8,9]



Fig- 2

2. Gymnema sylvestre (Gudmar)

Biological Source: Dried leaves of Gymnema sylvestre
Family: Apocynaceae
Common Names: Gudmar, Sugar destroyer
Geographical Source: India and tropical regions
Part Used: Leaves
Active Constituents: Gymnemic acid Saponins
Pharmacological Activities: Antidiabetic, Hypoglycemic, Anti-obesity
Mechanism of Action: Reduces glucose absorption, Increases insulin secretion ,Controls blood sugar[10]



Fig-3

10. Polyherbal Formulation

Mechanism of Action of Polyherbal Antidiabetic preparation

Momordica charantia (karela)	Curcuma longa (Turmeric)	Gymnema Sylvestre (Gudber)
• Insulin-like Activity • Increases Glucose Uptake • Reduces Blood Sugar • Insulin-like Effect	• Anti-inflammatory • Protects beta cells • Improves Insulin Sensitivity	• Reduces Glucose Absorption • Increase Insulin Secretion • Blocks Sugar Cravings • Reduces Sugar Cravings



Combined Effect on Diabetes Management

- Lower Blood Sugar
- Better Diabetes Control[10]

11. Advantages of Polyherbal Formulation

- Increased efficacy as a result of combination action[3]
- focuses on several pathways [3]
- Reduced adverse effects [3]
- Enhanced adherence to treatment[3]

DISCUSSION

It is evident from the literature review that these plants have a great deal of potential for treating diabetes. They may work in concert to improve glycemic control and lessen problems. Nevertheless, this research is restricted to a formulation based on reviews. Additional experimental research, such as in-vitro and in-vivo testing, is necessary to verify the formulation's efficacy and safety.[3]

CONCLUSION

This review demonstrates the beneficial antidiabetic qualities of Gymnema sylvestre, Curcuma longa, and Momordica charantia. Each plant has a unique method of action, but when combined, they have a greater impact on the treatment of diabetes mellitus. The polyherbal composition is easy to use, efficient, and could help manage blood sugar levels. To establish its effectiveness and safety, more research is necessary.4

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