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Formulation And Evaluation Of Polyherbal Anti Diabetic Drug.:A Review

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ABSTRACT:

Diabetes mellitus is defined as the metabolic disorder of multiple etiology characterized by chronic hyperglycaemia with the alterations in carbohydrates, protein and fat metabolism resulting from defects in insulin secretion, action or both. Type 1 diabetes mellitus develops when the insulin secreting pancreatic beta cells of islets of Langerhans are destroyed. This is an auto immune type of system. The type II diabetes is due to insulin resistance, i.e a disorderin which the cells within the liver, muscles and fat tissues do not use insulin properly. WHO projects that from the total diabetes patients in the world, more than half will live in Asia by 2030 and type II diabetes alone particularly increases up to 55 % by 2035. The people in developing countries still depend on the traditional practitioners and herbal medicine for their primary care. The interest for the medicinal plants with anti-diabetic properties has been increased worldwide for the treatment of diabetes mellitus than the conventional anti-diabetic drugs such as biguanides, sulfonylurea and thiazolidine dione, which are presently available.

The main aim of the work is to formulate and evaluate poly herbal anti diabetic tablets for medicinal purpose by using Gurmar and Neem leaf were collected from the local area, dried, powdered and extracted with ethanol separately and stored for further use.

Keywords: Diabetes mellitus, herbal plant, Gurmar, Neem**.**

1.INTRODUCTION:

Diabetes is a chronic medical condition characterized by elevated blood sugar levels. Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Insulin is a hormone that regulates blood glucose. Hyperglycaemia, also called raised blood glucose or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage tomany of the body's systems, especially the nerves and blood vessels. Uncontrolled diabetes can lead to various complications, affecting the heart, kidneys, eyes, and nerves. Lifestyle factors, genetics, and autoimmune responses contribute to diabetes.[1]

- **There are two main types: Type 1 and Type 2.**

  Type 1 where the body doesn't produce insulin, and Type 2, where the body doesn't use insulin effectively. Insulin is a hormone that regulates blood sugar. Type 1 and

  Type 2 diabetes differ in their causes, onset, and management:

  a.) Type 1 Diabetes:

  Cause: Autoimmune response where the body's immune system attacks and destroys insulin-producing beta cells in the pancreas.

  Onset: Typically occurs in childhood or adolescence but can develop at any age.

  Insulin: People with Type 1 diabetes require insulin injections or an insulin pump for survival.

  b). Type 2 Diabetes:

  Cause: Insulin resistance and insufficient insulin production by the pancreas.

  Onset: Often develops in adulthood, but increasingly seen in younger individuals dueto lifestyle factors.

  Insulin: Initially, the body may produce insulin, but it becomes less effective over time. Management includes lifestyle changes, oral medications, and sometimes insulin.

The world prevalence of diabetes among adults aging between 20-79 years will include 6.4%of diabetes amongst them that will impact on 285 million adults, in 2010, which will eventuallymultiply to 7.7% and will have a widespread amongst 439 million adults by 2030. Henceforth, there will be 69% growth in numbers of adults escorted by diabetes in developing countries and increased by 20% in established countries.[2]

NEED FOR EFFECTIVE ANTIDIABETIC DRUGS:

The main aim of Anti Diabetic Drug/ Therapy is to reduce the symptoms of hyperglycaemia and to deplete the risk of long-term complications resulting from diabetes. Anti Diabetic drugs are used to constrain glucose level in the blood and are hence used as a remedy for Diabetes Mellitus. Antidiabetic drugs are administered based on the type of diabetes the person is acquiring. Some are orally administered while some are administered via Injections termed insulins. The most common and frequently used anti diabetic drug is Metformin, which is the most common/ stereotyped oral medication for Type 2 diabetes. [3] Metformin works by aiding to restore the body's reciprocation to insulin.

PLAN OF WORK

- Literature survey
- Collection of plant material
- Sample extraction
- Formulation of anti-diabetic tablet.
- Evaluation of anti-diabetic drug

2.REVIEW OF LITERATURE:PLANT PROFILE

Neem and gurmar (Gymnema sylvestre) have been traditionally used in Ayurvedic medicine for their potential anti-diabetic properties.

NEEM:

- Neem (Azadirachta indica) is known for its various medicinal properties, including its potential to lower blood sugar levels. Neem, derived from the Azadirachta indica tree, has potential benefits for diabetes management. Its compounds may help lower blood sugar levels, improve insulin sensitivity, and reduce complications. It may help lower blood sugar levels due to compounds like nimbin and nimbidin that have anti- hyperglycemic properties. Neem may also enhance insulin sensitivity.[4]

TAXONOMY:

NEEM
Kingdom: Plantae
Phylum: Spermatophyta
Class: Dicotyledons
Order: Sapindales
Family: Meliaceae
Species: Indica
Scientific name: Azadirachta indica

TRADITIONAL MEDICINE:

Neem (Azadirachta indica) has a rich history of use in traditional medicine, particularly in Ayurveda, the ancient Indian system of medicine. key aspects of its historical use:

- **Ayurvedic Medicine:**

Ancient Roots: Neem is mentioned in ancient Ayurvedic texts, such as the Charaka Samhita and Susruta Samhita, dating back over 2,000 years.

Dosha Balance: Ayurveda categorizes neem as having bitter and pungent tastes, with coolingproperties. It is often associated with balancing the Kapha and Pitta doshas.

- **Blood Purification:**

Detoxification: Neem has been traditionally used for blood purification, believed to help eliminate toxins from the body. This aligns with its classification as a "blood purifier" in Ayurveda.

- **Skin Disorders:**

Dermatological Use: Neem has been a cornerstone in treating various skin conditions. Its antibacterial and antifungal properties make it effective against infections, eczema, psoriasis,and acne.

- **Oral Health:**

Dental Care: Neem twigs were historically used as natural toothbrushes, promoting oral hygiene. Neem's antimicrobial properties made it beneficial for preventing gum diseases andcavities.

- **Malaria and Fevers:**

Antipyretic Properties: Neem was traditionally used to manage fevers, including those associated with malaria. Its antipyretic (fever-reducing) effects were valued.

- **Digestive Health:**

Gastrointestinal Support: Neem has been employed to address digestive issues, including indigestion and intestinal parasites. Its bitter taste is thought to stimulate digestion.

- **Reproductive Health:**

Contraceptive Properties: Neem was historically considered a natural contraceptive. Traditional practices involved using various parts of the neem tree to prevent conception.

- **Anti-Inflammatory Use:**

Management of Inflammation: Neem's anti-inflammatory properties were harnessed to alleviate conditions associated with inflammation, including arthritis.

- **Ceremonial and Cultural Significance:**

Purification Rituals: Neem leaves have been used in purification rituals, symbolizing the cleansing of impurities, both physical and spiritual.[5]

- **CHEMICAL CONSTITUENTS:**

Neem contains active compounds like flavonoids, triterpenoids, and polysaccharides, which exhibit anti-diabetic properties. Neem also contains various chemical constituents, including azadirachtin, nimbin, nimbidin, and quercetin. These compounds contribute to its antimicrobial, insecticidal, and medicinal properties. In addition to azadirachtin, nimbin, nimbidin, and quercetin, neem also contains salannin, meliacins, beta-sitosterol, and variousfatty acids. These constituents collectively make neem a versatile plant with applications in agriculture, medicine, and skincare due to its anti-inflammatory and antibacterial properties.[6]

- **PHARMACOLOGICAL PROERTIES RELATED TO DIABETES TREATMENT:**

Neem exhibits pharmacological properties that may be beneficial in diabetes treatment. Compounds like nimbin and nimbidin in neem leaves are believed to have hypoglycemic effects, potentially lowering blood sugar levels. Additionally, neem may improve insulin sensitivity and reduce glucose absorption, making it a subject of interest in managing diabetes. Neem's anti-inflammatory properties, attributed to compounds like quercetin and beta-sitosterol, may also play a role in diabetes management by reducing inflammation associated with insulin resistance. Studies also suggest that neem extracts may help protectpancreatic beta cells, which are responsible for insulin production, and thereby contribute tobetter glycemic control. [7]

- **GURMAR:**

Gurmar, scientifically known as Gymnema sylvestre, is a plant native to the tropical regions of India, Africa, and Australia. In traditional medicine, especially in Ayurveda, it has been used for various

purposes. The Hindi name “Gurmar” translates to “destroyer of sugar,” highlighting its historical use for managing diabetes.Blood Sugar. Gurmar is known for its potential to lower blood sugar levels. It contains compounds that may inhibit sugar absorption in the intestines and enhance insulin function.

TAXONOMY:

GURMAR
Kingdom: Plantae
Phylum: Angiospermae
Class: Magnoliopsida
Order: Gentianales
Family: Meliaceae
Species: Indica
Scientific name: Gymnema sylvestre

TRADITIONAL MEDICINE:

Gurmar, or Gymnema sylvestre, has a rich history of use in traditional medicine, particularly in Ayurveda, the ancient Indian system of medicine. Historical aspects of Gurmar’s use:

Ayurvedic Medicine:

Gurmar has been a part of Ayurvedic medicine for over 2,000 years. It is traditionally known as “Meshashringi” or “Gurmar,” meaning “destroyer of sugar.” Ayurveda emphasizes aholistic approach to health, and Gurmar has been used to manage various ailments.

Diabetes Management:

One of the prominent historical uses of Gurmar is for managing diabetes. Ayurvedic practitioners believed that consuming Gurmar could help control blood sugar levels and alleviate symptoms associated with diabetes.

Sweet Suppressant:

Gurmar earned its reputation as a “sugar destroyer” due to its ability to suppress the taste of sweetness. In Ayurveda, it was used to reduce the desire for sweet foods, contributing to weight management and diabetes control.

Digestive Aid:

Traditional uses of Gurmar extend beyond diabetes. It was also employed as a digestive aid, helping to alleviate digestive issues and promoting overall gut health.

Anti-Inflammatory Properties:

Gurmar was historically used for its anti-inflammatory properties. It was believed to have a cooling effect on the body and was utilized in Ayurvedic formulations for inflammatory conditions.

Malaria and Snake Bites:

In traditional medicine, Gurmar was employed for treating conditions such as malaria and snake bites.

CHEMICAL CONSTITUENTS:

Gurmar (Gymnema sylvestre) contains a variety of chemical constituents, with the active compounds believed to contribute to its medicinal properties. Chemical constituents found in Gurmar are:

Gymnemic Acids:

These are the major bioactive compounds in Gurmar. Gymnemic acids, particularly gymnemic acid I, II, and III, have been studied for their potential anti-diabetic effects. They are thought to inhibit the absorption of glucose in the intestines and may enhance insulin function.

Gurmarin:

This peptide is found in the leaves of Gurmar and is known for its anti-sweet activity. Gurmarin is believed to bind to taste receptors on the tongue, inhibiting the sensation of sweetness and reducing the desire for sugary foods.

Saponins:

Gurmar contains various saponins, including gymnemasaponins. Saponins are plant compounds with diverse biological activities, and in Gurmar, they may contribute to its anti- diabetic and anti-inflammatory properties.

Flavonoids:

These are antioxidant compounds found in Gurmar. Flavonoids contribute to the plant's overall health benefits and may have anti-inflammatory and anti-diabetic effects.

Quercitol:

A sugar alcohol found in Gurmar, quercitol, has been identified as one of the components contributing to the plant's ability to lower blood sugar levels.[8]

PHARMACOLOGICAL PROPERTIES RELATED TO DIABETES TREATMENT:

Gurmar is known for its potential to lower blood sugar levels. It contains compounds like gymnemic acids, which may reduce the absorption of glucose in the intestines and enhance insulin function. These properties make Gurmar a subject of interest for managing diabetes.

- **Insulin-Mimetic Effect:**

Gymnemic acids in Gurmar have been reported to exhibit an insulin-mimetic effect. They may bind to insulin receptors and stimulate insulin-like actions, contributing to improved glucose utilization.

- **Beta-Cell Regeneration:**

Some studies suggest that Gurmar may have a protective effect on pancreatic beta cells. These cells are responsible for insulin production, and Gurmar's potential to support their regeneration could be beneficial for individuals with diabetes.

- **Reduced Sweet Sensation:**

Gurmarin, a peptide found in Gurmar, is believed to interact with taste receptors on the tongue, reducing the sensation of sweetness. This may lead to a decreased appetite for sweet foods assisting in weight management and blood sugar control.

- **Lipid-Lowering Effects:**

Gurmar has been investigated for its impact on lipid metabolism. It may help lower cholesterol and triglyceride levels, contributing to cardiovascular health, which is crucial for individuals with diabetes who are at an increased risk of cardiovascular complications.

- **Anti-Inflammatory Properties:**

Gurmar contains compounds with anti-inflammatory effects. Chronic inflammation isassociated with insulin resistance, and the anti-inflammatory properties of Gurmar may contribute to its overall benefits in diabetes management.[9]

- **Weight Management:**

By reducing the desire for sweet foods and potentially influencing metabolic processes, Gurmar may play a role in weight management, which is important for individuals with diabetes.[8]

4.METHODOLOGY:

A polyherbal drug formulation involves careful consideration of various factors, including theselection of herbs, extraction methods, dosage, and formulation techniques. Simplified overview of the process for formulating a polyherbal drug using neem and gurmar for managing diabetes:

Herb Selection:

Choose high-quality neem (Azadirachta indica) and gurmar (Gymnema sylvestre) plant material. Verify the authenticity and purity of the herbs to ensure consistent and effective results.

Extraction of Active Compounds:

Utilize appropriate extraction methods (e.g., solvent extraction, water extraction, or a combination) to obtain the active compounds from neem and gurmar. Focus on extracting key components such as neem's nimbin and gurmar's gymnemic acids.

Standardization:

Standardize the herbal extracts to ensure consistent levels of bioactive compounds in each batch of the polyherbal formulation. This helps in maintaining efficacy and quality.

Combination and Synergy:

Determine the optimal ratio of neem and gurmar extracts to achieve a synergistic effect. Consider their individual pharmacological properties and how they complement each other in managing diabetes.

Excipients and Stabilizers:

Introduce excipients or stabilizers to enhance the stability, shelf life, and bioavailability of thepolyherbal formulation. These may include binders, fillers, or other natural compounds.

Dosage Form:

Decide on the dosage form, such as capsules, tablets, liquid extracts, or powders, based on factors like patient preference, bioavailability, and ease of administration.

Implement rigorous quality control measures throughout the formulation process. Regular testing should be conducted to ensure the absence of contaminants and the consistency of active componds.

5. CONCLUSION:

The conclusion of a review article on the anti-diabetic effects of neem and gurmar might summarize that both neem and gurmar possess potential anti-diabetic properties supported by scientific evidence. They may aid in managing blood sugar levels, improving insulin sensitivity, and potentially mitigating diabetic complications. However, more extensive research, including clinical trials, is needed to fully understand their mechanisms of action and establish their efficacy and safety for diabetic management before recommending themas primary treatment.

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